

## **COMMUNICATING ENVIRONMENTAL INFORMATION: THE INDUSTRY'S EXPERIENCES.**

**Lodewijk G. Niemöller**  
**in co-operation with participants**  
**MRPI project stichting Dak & Milieu**  
**(Foundation for Roofing & Environment)**  
**Stichting Dak & Milieu, Vianen, The Netherlands**

### **Summary**

The Stichting Dak & Milieu incorporates a large number of European producers of bituminous roofing materials, co-operating to communicate environmentally relevant product information (MRPI) based on LCA methodology. Using an especially designed spreadsheet each participant in this project is able to determine the environmental impact of products and processes (directed environmental care). The most important experiences so far:

- It is important that producers of bituminous roofing materials set up a joint approach at national or international level
- It is essential that suppliers of raw materials co-operate
- Do not act rashly when communicating LCA information. First create additional procedures and agreements regarding LCA methodology in order to ensure that environmental information is transparent. The MRPI manual issued by the MRPI foundation is a good start
- Create testing procedures for external verification of environmental information
- Gather environmental standard figures within your own product group first. Don't set up a LCA project in co-operation with other product groups, aiming to communicate
- Producers are responsible for their product and for the environmental standard figures of that product. Try to ensure in-house know-how of LCA procedures, enabling you to compare products and processes within your own company (product specific environmental care)

The Dutch bituminous roofing materials industry has gained a lot of experience with LCA. At the moment, this know-how is

applied to product specific environmental care and to improvement of procedures and methods of determination. The stichting Dak & Milieu would like to ask national and international producers and suppliers to work together in gathering environmental standard figures and offers some ideas to that extent as well.

## Résumé

Un grand nombre de fabricants de matériaux de toiture bitumineuse coopèrent au sein de la fondation Dak & Milieu<sup>1</sup> dans le but de communiquer à terme des informations de produits importantes pour l'environnement, *Milieurelevante productinformatie (MRPI)*, fondées sur la méthode LCA (évaluation des cycles de vie). Au sein de ce projet, chaque participant est apte à déterminer la charge environnementale des produits ou processus (souci de l'environnement orienté), grâce à l'utilisation d'un programme de tableur développé par la fondation. Les principales expériences collectées jusqu'à ce jour sont les suivantes :

- l'approche (inter)nationale commune des producteurs de matériaux de toiture bitumineuse est essentielle ;
- la coopération avec les fournisseurs de matières premières est essentielle ;
- éviter toute communication d'informations LCA non raisonnées, veiller tout d'abord à des procédures et accords complémentaires concernant la méthode LCA, afin de permettre des informations environnementales uniformes. Le manuel d'utilisation MRPI de la fondation MRPI s'avère à ce sujet une excellente base de départ ;
- veiller à des procédures d'essai pour une vérification externe des informations environnementales ;
- commencer tout d'abord par la collecte d'indices environnementaux au sein du propre groupe de produits. De plus, ne jamais lancer un projet LCA commun avec des groupes de produits concurrentiels ayant pour objectif la communication ;
- un fabricant est responsable pour son propre produit et de même également pour les indices environnementaux. Pour cette raison, essayer d'intégrer vous-même la connaissance LCA au sein de votre site, afin de pouvoir réaliser des comparaisons de processus et de produits

internes simples (soucis de l'environnement orienté sur le produit).

Aux Pays-Bas, l'industrie des toitures bitumineuses a accumulé une riche expérience avec la LCA. Cette expérience est actuellement plus particulièrement utilisée pour le souci de l'environnement orienté sur les produits et en vue de l'amélioration des procédures et méthodes de détermination. La fondation Dak & Milieu appelle à une coopération (inter)nationale (fabricants et sous-traitants) pour la collecte des indices environnementaux et propose également à ce sujet quelques suggestions.

### **Zusammenfassung**

Innerhalb der "Stichting Dak & Milieu<sup>2</sup>" arbeitet eine große Zahl von europäischen Herstellern von bituminösen Dachdeckungsmaterialien zusammen, um mittel- bis langfristig mit umweltrelevanten Produktinformationen (MRPI) auf der Grundlage des LCA-Verfahrens kommunizieren zu können. Dieses Projekt macht es für jeden Teilnehmer möglich, mittels eines von der "Stichting" entwickelten Rechenprogramms die Belastung zu ermitteln, die die Produkte oder Verfahren für die Umwelt haben (gezielter Umweltschutz). Bis jetzt hat man die nachstehenden wichtigsten Erfahrungen gemacht:

- Ein gemeinsames Vorgehen der Hersteller von bituminösen Dachdeckungen – landes- und weltweit – hat sich als wichtig erwiesen;
- die Mitwirkung der Zulieferer von Rohstoffen ist von entscheidender Bedeutung;
- LCA-Informationen sollten niemals unüberlegt weitergegeben werden – man sollte zunächst ergänzende Verfahren und Vereinbarungen schaffen, um eine eindeutige LCA-Methodik zu ermöglichen. Die von der MRPI-Stiftung erstellte MRPI-Anleitung bietet dafür einen guten Ausgangspunkt;
- Es sollten Prüfverfahren für die externe Verifizierung von Umweltinformationen geschaffen werden;
- Man sollte zunächst damit beginnen, innerhalb der eigenen Produktgruppe Umweltkennzahlen zu sammeln. Aus diesem Grund sollte nicht sofort ein gemeinsames LCA-Projekt mit konkurrierenden Produktgruppen mit der

Kommunikation als Ziel gestartet werden.

- Jeder Produzent ist für sein Produkt und damit auch für die Umweltkennzahlen verantwortlich. Aus diesem Grund sollte man versuchen, selbst die LCA-Kenntnisse zu sammeln, damit man auf einfache Weise interne Produkt – und Verfahrensvergleiche erstellen kann (produktorientierte Umweltfürsorge).

Die Branche der bituminösen Dachdeckung hat in den Niederlanden mit LCA viel Erfahrungen erbracht. Diese Erfahrungen werden zur Zeit vor allem für die produktorientierte Umweltfürsorge sowie zur Verbesserung von Verfahren und Bestimmungsmethoden angewandt. Die „Stichting Dak & Milieu“ ruft zur (inter-)nationalen Zusammenarbeit (der Hersteller und Zulieferer) beim Zusammentragen der Umweltkennzahlen auf und legt in diesem Zusammenhang auch einige Anregungen vor.

## **Sommario**

La fondazione Dak & Milieu<sup>3</sup> raggruppa un gran numero di fabbricanti europei di prodotti bituminosi per la copertura dei tetti con lo scopo di poter fornire in futuro ai consumatori informazioni sul prodotto rilevanti dal punto di vista ambientale (MRPI), basate sulla metodologia LCA (Analisi del ciclo di vita). I partecipanti a questo progetto sono in grado, grazie ad un programma spreadsheet sviluppato e fornito loro dalla Fondazione, di determinare l'impatto ambientale dei prodotti e dei processi (protezione ambientale mirata). Le esperienze più importanti in questo campo finora possono essere così elencate:

- un approccio comune (inter-)nazionale da parte dei fabbricanti di prodotti bituminosi per la copertura dei tetti è importante;
- la cooperazione dei fornitori di materie prime è essenziale;
- non si devono comunicare ai consumatori informazioni LCA senza un piano ben ponderato, ma è necessario creare prima le procedure extra e le regole inerenti alla metodologia LCA, in modo da rendere possibile l'univocità delle informazioni relative all'impatto ambientale. Il manuale MRPI della Fondazione MRPI offre un buon punto di partenza;

- bisogna creare procedure di controllo per le verifiche esterne dell'informazione sull'impatto ambientale;
- si consiglia di iniziare a raccogliere gli indici d'impatto ambientale all'interno del proprio gruppo di prodotti; non avviare quindi immediatamente un progetto LCA comune con gruppi di prodotti concorrenti che si ponga come finalità la comunicazione ai consumatori;
- un fabbricante è responsabile dei suoi prodotti e quindi degli indici d'impatto ambientale. È quindi consigliabile avere all'interno della propria organizzazione conoscenze LCA, in modo da poter facilmente effettuare dei confronti interni relativi ai prodotti ed ai processi (protezione ambientale mirata ai prodotti).

Nei Paesi Bassi il settore della produzione di coperture bituminose dei tetti ha già molta esperienza nell'applicazione della metodologia LCA, esperienza che attualmente viene usata soprattutto per la protezione ambientale mirata ai prodotti e per il miglioramento delle procedure e dei metodi di valutazione. La fondazione Dak & Milieu esorta alla cooperazione a livello (inter)nazionale (fabbricanti e fornitori) per riunire gli indici sull'impatto ambientale e offre alcuni suggerimenti al riguardo.

<sup>1</sup> Toit & Environnement

<sup>2</sup> Dach und Umwelt

<sup>3</sup> Tetto & Ambiente

## **1 Introduction**

At the previous IWA conference Mr D. van der Bom and I identified the motives for recording environmental information pertaining to roofing materials, in the lecture called "A proactive approach to the environment by roofing materials producers is useful". At that time we also disclosed some details of the approach of the stichting Dak & Milieu, the Dutch Foundation for Roofing & Environment<sup>1</sup>. The approach is based on the independent operation of producers, using a software program put at their disposal by the stichting Dak & Milieu.

The software allows producers to gather essential information for product development, benchmarking, policies and strategies. Today I would like to examine the experiences of the participants further, discuss several communication issues and

express my expectations regarding environmental communication in the near future. Furthermore, I would like to emphasise that environmental information on the basis of LCA is not a typically Dutch pastime. We seem to be ahead of Europe, yet in most European countries and in Brussels, the regulators are considering this subject emphatically.

## **2 Procedures for Communication**

LCA methodology seems very complex, but its complexity is not that bad for people who know about the product and the process (the producers). For producers, it is the time-consuming aspect of LCA (Life Cycle Assessment) that counts, not the complexity. For optimal application of results the producer must perform a LCA calculation, partly because it has been designed as product development tool. This might be stating the obvious, but it is really important when dealing with communication as a subject. For product development, usually carried out by the producer, a univocal arithmetic method (software) should suffice. In this case users base the product comparison on the same basic principles and assumptions, allowing them to rate deficiencies and sensitivity at their true value. However, LCA methodology is not sufficient for communication and public environmental comparisons. That is why the MRPI project, which is supported by the entire building products industry and the Dutch Ministry of Housing, Spatial Planning and the Environment, includes several additional procedures. These procedures are outlined in a manual and a testing protocol and form a good starting point for clear-cut, reliable environmental information. From time to time agreements and procedures still need to be adjusted, taking new experiences into account. This is the first step in providing environmental information and undoubtedly there will be many ups and downs as we go along. To anticipate such developments it is imperative that producers within a product group are familiar with the contents of LCA methodology, enabling timely acknowledgement of the consequences of possible developments. Fortunately, the producers of bituminous roofing materials co-operating within the stichting Dak & Milieu are very knowledgeable about LCA. Be aware that a seemingly innocent agreement or procedure might have far-reaching consequences for the environmental communication within a product group. I would like to tell you about our

experiences as a means to illustrate the need for proper agreements and procedures with regards to communication.

### **3 Functional Unit**

Before discussing every detail of our approach, I would like to point out what might be the most important prerequisite for clear communication: functional unit. Without an agreement between all providers of roofing systems for flat roofs, clear and precise environmental information is impossible. It will just be comparing apples and oranges. The MRPI project for the Dutch building suppliers defines the functional unit for flat roofs as follows:

*"A watertight flat or slightly pitched roof with a maximum pitch of 20°, which at least complies with the building regulations as set out in the Dutch national building decree and which has a life of 75 years, calculated on the basis of a 1000m<sup>2</sup> roof (40x25m<sup>2</sup>), in units of 1m<sup>2</sup>, being representative of roof surfaces of more than 50m<sup>2</sup>."*

This functional unit applies to all roofing systems communicating environmental information on the basis of the MRPI manual. In theory it is of course possible to choose another functional unit. Information about 1m<sup>2</sup> roofing material is of course also a valid choice. The most important issue here is that industries should come to a standardised agreement.

Maybe the 75 years life span requires some explanation. It doesn't mean that either the product or the system is expected to hold for 75 years. If it holds less than 75 years, maintenance and/or replacement must be included in the calculation. In view of this matter another important agreement should be mentioned. Calculations for MRPI are always based on integers. We feel that this agrees best with reality. The end of the life of the building is also the end of the useful life of the building element in question. Therefore, reduction of the environmental impact because of the remaining technical life of the building element is not relevant.

The building element called roof consists of several parts, such as insulation, roofing materials and sub-construction. These parts are often produced and supplied by different companies.

It is our belief that we should only give information about the products for which we are responsible. Lead-throughs, edging strips, etc. should not be included in the calculation. But if another product group would like to give information about these items, there is a problem. Without harmonisation the information cannot be compared.

Finally, we mustn't forget the information consumers. There are several suppliers of LCA software (building level) and they will also want to set out preconditions for the functional unit. Such demands should be harmonised at a very early stage. Our experience here in the Netherlands has taught us that without an early start there will be a need for lengthy harmonisation discussions afterwards, at which point in time compromises are an inevitable solution.

#### 4 3-Format System

In our project a system called 3-format system plays a key role. I gave a detailed description of the 3-format system in my presentation at Copenhagen.

The principle of the 3-format system is the communication of environmental profiles (see figure 1) throughout the chain. Each link in the chain is responsible for its "own" environmental profile. An environmental profile is incorporated in environmental information. This prevents the forming of obstacles in the communication of environmental information due to protection of trade secrets. It is not possible to gather recipe information from the collected environmental profiles.

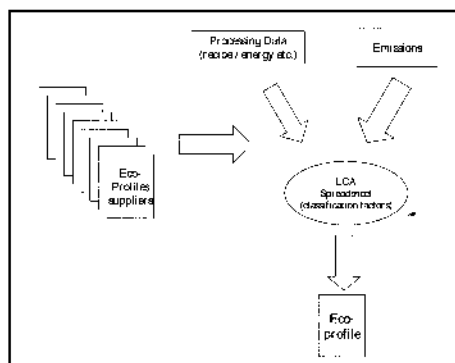


Figure 1 3-format system



An important prerequisite for the successful application of the 3-format system is a simple software program to calculate the environmental profile. Most LCA software programs do not require collected environmental information. In co-operation with AMPO the stichting Dak & Milieu has created a spreadsheet calculating the environmental impact according to LCA methodology (CML). Complimentary copies of this spreadsheet are available to all project participants and their suppliers. With this spreadsheet you can calculate the environmental profile of a product or system without having to follow demanding courses first. The only requirement is input data. And that is the whole issue: how can we obtain the necessary input data? Without reliable input data the outcome of a LCA calculation is not suitable for communication.

NB – At this moment a well-known Dutch software program (Eco-Quatum) for calculation of environmental impact at building level has been adjusted to allow for environmental profiles to be used as input data.

## 5 Collecting Input Data (cradle to gate)

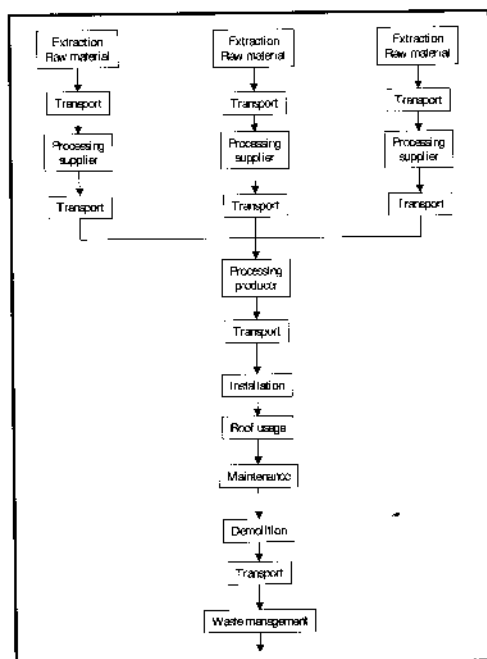


Figure 2 Simplified flow chart life cycle roofing system

## **5.1 Approach**

Figure 2 shows a simplified flow chart of the life cycle of a roofing system. I will use this chart to explain our approach and several important agreements with respect to communication. I will start with the centre, the producer of the roofing materials (participant).

## **5.2 Gathering Product Location Standard Figures**

Within our project the individual participant (the producer) is responsible for the environmental profile of 1m<sup>2</sup> APP or SBS modified bituminised polyester mat<sup>2</sup>, 4 mm thick, representative of their product range for the Dutch market, stored in the warehouse at the production location. This means that the producer is responsible for gathering or measuring the following information:

- Net input production location
  - Raw materials
  - Energy
    - Electricity
    - Gas
    - Fuel oil
    - Brown coal
    - Fuel for internal transport
    - Cooling water
  
- Net output
  - Emission (air)
  - Emission (water)
  - Emission (ground)
  - Waste
  - Sales

An environment and quality co-ordinator, a production manager, a purchaser and an accountant were responsible for gathering the information. In most cases the necessary information is already measured or registered at intervals. If no emission details are available, the first step is to take a look at a permit, for instance the environmental management permit.

On the basis of the recipe and the product's energy consumption and waste it is fairly easy to calculate the first environmental profile for the production of 1m<sup>2</sup> roofing material as internal benchmark.

### **5.2.1 Gathering Supplier Standard Figures**

To carry out a proper LCA calculation for roofing materials, reliable and representative environmental profiles of the ingredients (bitumen, APP, SBS, IPP, slate, polyester mat, glass fibre, etc.), secondary materials (packaging materials), means of transportation, energy carriers, etc. are very important. As I stated earlier, suppliers should be responsible for the environmental profiles of raw materials, secondary materials and other tools.

In a series of three meetings the stichting Dak & Milieu informed the suppliers of the participants about the project purposes and asked for their co-operation. Fortunately, a large number of suppliers have agreed to co-operate by giving information. Although this was a large step in the right direction, it is not enough. To optimise the environmental profiles there should be a joined platform for continuous harmonisation. In this project we learned that gathering reliable information about raw materials and secondary materials is preferably done in a joined effort. Within the project each supplier is assigned to one of the participants. Supported by the project management team (if necessary), this participant represents all of the participants as contact for these supplier.

The most important reasons for a joined approach are:

1. Efficiency
2. Costs
3. Mostly the same suppliers of raw materials
4. Standardisation

Both the producer and the supplier can benefit from the joint approach, which results in standardisation of preconditions. In that case, suppliers (of polyester, bitumen, polymers) will no longer be bothered with 1001 requests for slightly altered preconditions. Each producer will need less time to gather the necessary information and all producers receive the same

information for the same raw materials. Discrepancies due to the use of data in different quality ranges are thus avoided and an important precondition for clear communication is filled.

From a practical point of view it is currently not possible to gather environmental information from all of the suppliers of a number of important components. On the one hand there's the general data (energy, transport, processing of waste), on the other hand there are numerous smaller suppliers, for instance of packaging materials. Within our project we've asked AMPO (a consultancy specialised in LCA methodology) to create generic environmental profiles for these specific cases. Also, these profiles can be used as benchmarks in case there will be specific environmental profiles in the near future. At this moment, a large number of background processes and energy carriers in the Netherlands have been provided with generic environmental standard figures, fulfilling another important prerequisite for transparent and reliable environmental information.

### Sensitivity Analysis

All of the components of bituminous roofing materials in our project, including the packaging materials, now have environmental profiles. This means that all participating producers are now able to calculate environmental profiles representative of their products. Through sensitivity analysis it is possible to indicate whether supplementary activities and/or improvements are necessary. This kind of analysis illustrates the importance of raw materials in the overall environmental profile of bituminous roofing materials. The production of roofing sheets contributes little to the overall profile and the differences between production locations are often negligible. If there are any differences, they are mostly to blame on the type of energy carrier for the production (natural gas, fuel oil, diesel, and brown coal).

I will try and explain this thought during the presentation with several examples and I ask all of the suppliers to start taking gathering environmental standard figures and performing the related improvement activities seriously, if they haven't begun with it already. It is in the best interest of all of us to work at an optimum environmental profile for bituminous roofing materials.

## Data Quality

With regards to communication I would like to share another important experience with you. Improvement of the quality of environmental profiles (data quality) doesn't automatically lead to improvement of the readings in the environmental profile. Indeed, most of the time it will be the opposite. This means that data quality is an important prerequisite for communication. Unfortunately, this is a complex matter to which there is no conformity yet in the Netherlands. However, registering generic environmental standard figures for the key background details is a significant step in the right direction.

## Responsibility

We are suppliers of roofing sheets and we cannot, and will not, take responsibility for environmental information of our suppliers. We cannot, and will not, determine whether or not environmental standard figures provided by our suppliers are correct. Each supplier must declare in writing (manufacturer statement) that the environmental information provided is representative of their product(s) and complies with predefined criteria.

### **5.3 Calculating the Cluster Average**

All participants have agreed to hand in environmental profiles that are representative of their product range. There are several types of profiles:

- APP modified;
- Mineralised APP modified;
- SBS modified;
- Mineralised SBS modified.

On the basis of this series of environmental profiles the project management team will proceed to compose an environmental profile for the industry. In our case we set up an industrial environmental profile according to the MRPI manual. This manual contains criteria for composing a cluster average. The most important criterion is that a weighted average must be set up in such a way, that the internal distribution of the individual environmental profiles for each environmental impact mark adds up to 20% max. A spread of 20% per environmental

impact seems like a lot, but for LCA calculations this is fairly strict. Especially if an environmental impact with low readings is involved, it is quite possible that there will be one single peak. In such cases you're allowed to communicate 80% of the worst case (if explained properly).

In our project the range of environmental profiles submitted by the individual participants proved to be quite limited. Our aim, one single environmental profile representative of modified bituminous roofing sheets, could therefore be realised.

As stated before, LCA is merely a handle for product and process development. The project participants received the following information as benchmark:

- Worst case for each environmental impact mark;
- Best case for each environmental impact mark;
- Average

## **6 Environmental Standard Figures (gate to grave)**

### **6.1 General**

The listing of environmental standard figures for all life cycle phases from product location (gate) to scrap (grave) is carried out from a central point. These are the phases involved:

1. Transport from production location to central point in the Netherlands.
2. Processing.
3. Usage.
4. Maintenance and replacement.
5. Scrap.

### **6.2 Transport**

The major problem here is the environmental standard figure for means of transport. In our project we started with several generic environmental profiles for the participants, for instance for truck transport. As specified, a report containing generic environmental standard figures for the major means of transport in the Netherlands is now available. Unless more favourable figures can be presented, these are the standard figures that must be used in calculations.

The transport distance in our project is based upon the average of real distances between product locations from participants. The sensitivity analysis shows that this assumption lies within the criteria set out in the MRPI manual.

### **6.3 Processing**

The advantage of the 3-format system is that users may calculate several systems, compare results and base policy decisions on the outcome, and all of that in less than no time. From these calculations we concluded that a joined approach of environmental standard figures is the most obvious strategy at this moment. In relation to the entire environmental profile, environmental standard figures resulting from a range of processing directions set up by various companies are too much alike. Evidently, joint registration of reliable generic information for processing of bituminous roofing materials is the best option. During the presentation I will illustrate this statement with the results of several sensitivity analyses.

### **6.4 Usage**

The usage of building products and systems is currently not incorporated in many LCA calculations. The question remains whether this is rightly so. The MRPI manual states that communication must include the fact whether or not usage is a part of the calculation. This agreement helps making communication transparent, but it is not enough.

Usage can be seen as the leaching of components by means of water in exterior application of building products and the use of energy and water during the use of the building. In some cases usage plays a more important role in the entire environmental impact than people may realise.

Why is emission during production included in the calculation, but emission during usage not? Why is leaching of components by means of water not included in calculations for roofing systems? Initiated by the stichting Dak & Milieu the international and national bituminous roofing materials industry has performed many studies of leaching of bituminous roofing materials. Such research projects are expensive and complex. Therefore, it is quite obvious that usage of bituminous roofing

materials should be an issue of co-operation for the industry as well.

### **6.5 Maintenance and replacement**

Because the lifetime of the building is set at 75 years, for all types of flexible roofing systems maintenance and replacement must be included in calculations. The main question is: When? Clearly, the decision influences the end result. Major points of interest are:

- What durability is to be used in calculations?
- What would be an acceptable explanation for the life selected?
- How should we deal with innovative products?

The MRPI manual includes some criteria with respect to this issue, but it will be subject to discussion nonetheless. In our project we came to an agreement about maintenance and replacement with regards to a number of systems. However, communication and rules require clear and objective criteria. Also, the assessment must be affordable. At the moment a standards committee is developing a Dutch standard for the determination of material specific environmental profiles of buildings (MMG). I am very curious how the standards committee will deal with this. Without criteria that comply with the preconditions set out, transparent communication of environmental standard figures is not to be expected. If the committee decides that communication of environmental standard figures is desirable, I would advise to communicate a cluster environmental profile.

### **6.6 Scrap**

The scrap phase, like the previous phase, could influence the environmental profile as a whole. Also, it involves calculating activities that will take place years from now. This means that in communication it must be clear what the scrap scenario will be. Some examples of subjects of discussion:

- The technical viability of recycling is proven. But there is no supply of recycling materials.
- The capacity of the recycling plant is not in proportion to



- the market size.
- The capacity of the recycling plant is sufficient, but there is no supply of recycling materials due to economical factors.
  - New materials.

The MRPI foundation in the Netherlands has initiated the first step towards transparent communication through criteria as set out in the MRPI manual. Based on the current situation in the Netherlands, there are default waste processing scenarios for all common building materials. The referential scenario for bituminous roofing materials is 15% dump, 80% incineration with energy recovery, 5% recycling and 0% reuse. This is the scenario that must be used in calculations, unless another plausible scenario is presented. Scenarios are only acceptable if there is a technically operating recycling plant and a functioning return system (for example guaranteed take-back amounts).

In our project we've determined generic environmental profiles for various scrap and waste scenarios. Especially dumping and incinerating waste matter are joint (national) items. Internationally there might be some differences, for instance with respect to the distribution and efficiency of the incineration plant. That is why international co-operation can only focus on the main lines. Of course, recycling is an important scenario for bituminous roofing materials. A number of participants already have their own plant. The 3-format system allows for calculation and comparison of various scenarios. On the basis of these calculations strategic choices with regards to the individual or joint communication are made (both in the past and in the future).

## **7. Agreements and Procedures**

### **7.1 General**

The foregoing shows that numerous agreements and procedures are necessary in order to communicate environmental standard figures properly. ISO 14040 [lit ..] provides little hold, partly because it addresses the issue in general terms. The MRPI manual [lit...] of the MRPI foundation can be seen as a big step in the right direction. In addition to

the foregoing I would like to explore several important agreements included in this manual. These are:

- LCA methodology
- Allocation
- Data quality

## **7.2 LCA methodology**

A consistent LCA methodology might well be the most important precondition for transparent, reliable environmental information. This might be stating the obvious, but it is not as obvious as it would seem. The LCA method of the University of Leiden (CML) is used extensively, both nationally and internationally. However, there are a large number of other (incomparable) methods. People are working at it nationally and internationally, but the transparency needed unfortunately has not (yet) been achieved. Even within the Netherlands there are multiple LCA methods in use (CML, Eco-Indicator, Twin). Scientists are not sitting still.

Fortunately, through the MRPI Foundation the Dutch building suppliers all chose the method produced by the University of Leiden. But just now, when producers are contemplating to communicate, a second version of the CML method (new classification factors) is launched. The official publication is delayed, but it will be published towards the end of the second quarter of this year. Because the results from CML method 2 differ from CML method 1 results, our industry timely decided that no information would be communicated on the basis of the "old" method. Nobody is helped by communication of two environmental profiles that cannot be compared, within a short period of time. Therefore, we will have to wait for the final version of CML method 2 before we can start to communicate.

If we want to establish an internationally workable environmental profile, we must first determine the LCA method (classification factors) to be used.

## **7.3 Allocation**

In all discussions about LCA allocation plays a key role. It would be going to far to discuss this matter extensively at this

moment, although I would like to show you an example of why producers of roofing materials **and** their suppliers must be involved in such discussions from the very beginning.

Allocation is in fact the distribution of environmental impact. This is essential for:

- Multi-input processes
- Multi-output processes
- Recycling

Figure 3 is a diagram of a multi-output process. In this example, 2 products are produced in one and the same process. Product 1 weighs 1 kg and is sold at a price of 6 Euro, the other product weighs 4 kg and is sold at a price of 4 Euro (1 Euro / kg). How should the environmental impact be allocated to these products? Many methods have been developed for this task, but mostly we use allocation based on mass. In this case 20% of the environmental impact is allocated to product 1 and 80% to product 2. Another option would be to allocate on the basis of economic value. In our example that would mean that 60% of the environmental impact is allocated to product 1 and 40% to product 2.

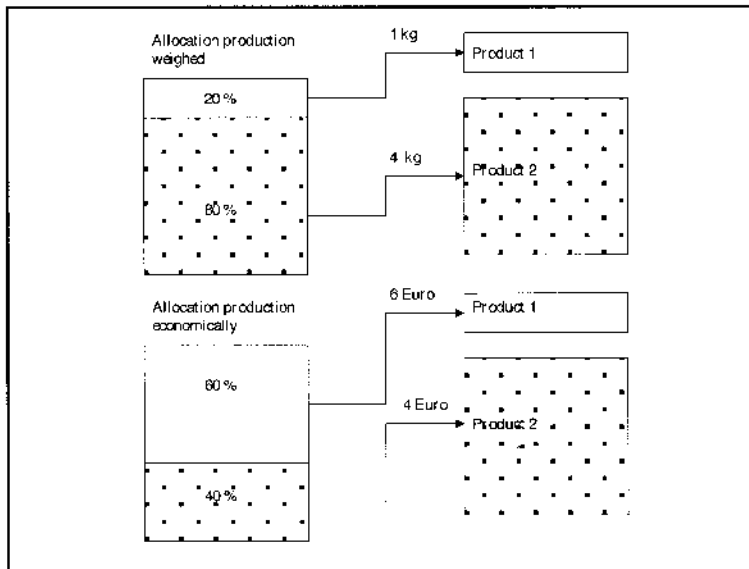


Figure 3 Allocation environmental impact

The influence of this choice on the definite version of the environmental profile is unmistakable. Transparent communication is only feasible if there are allocation guidelines. It is wise to be involved in the decision-making process for such matters at an early stage. This goes for the producers of bituminous roofing materials as well as for the suppliers.

#### **7.4 Data Quality**

I've mentioned it before: Data quality. A well-founded system for determining data quality is essential for transparent and reliable environmental information. The Dutch building products industry has recognised this problem through the MRPI Foundation and set out a number of criteria (e.g. mass and energy balance) and generic values for several components. These criteria are not sufficient. What we need is clear evaluation of data quality. Especially in an industry where things are well organised, it is imperative that the competition meets the same conditions.

#### **8. Determining Material Specific Environmental Profiles for Buildings (MMG)**

Together with a large number of producers of building products the stichting Dak & Milieu has always promoted an approach to performance at building level. Naturally, it would be insane to compare products on the basis of LCA and subsequently invest heavily in it, when this environmental investment is not visible at building level. There are software programs suitable for calculation at building level. A well-known program in the Netherlands is Eco-Quantum. The Dutch government wishes to incorporate environmental demands in the building regulations from 2002. Since the Dutch regulations contains performance demands for the entire building or building part instead of product demands, standardised determination for buildings is required.

The development of standardised determination gives ample room for all the points of discussion mentioned earlier. It is clear that a vast number of fundamental choices must be made in the process of determining and that these choices will directly influence the communication of environmental information. This means that we, and I ask for the support of our suppliers as

well, must keep close watch on the activities of this standards committee.

I would also like to state my expectations as for the use of this standardised determination method. Much like a constructor optimising the strength characteristics of a building, optimisation of the environmental impact of a building will be called for in the future as well. And much like the optimisation of strength, the focus will be on those construction parts that generate the best environmental profit. I don't expect constructors or designer to vary each building product. Therefore, the standardised determination will be divided in an abridged version with generic environmental standard figures for building products or systems and a comprehensive version with specific environmental standard figures. Determining generic environmental standard figures for building products and/or systems will greatly influence the communication possibilities of producers. The cluster environmental profiles we've calculated will surely be used.

## **9. Certification**

Now, perhaps it is clear why we are not yet communicating environmental information. Currently, we use our knowledge to improve products and processes and to develop necessary procedures. Also, together with the insulation industry we concluded that separate communication of environmental information does not fit within our communication strategy. We prefer to communicate secured product information, whether this be technical or environmental, through one single channel. We feel the market does not need a great number of different information sheets. Therefore, in co-operation with the insulation industry we've asked the KOMO certification institutes to make it possible to include environmental information (based on the MRPI manual) in KOMO quality certificates. Adding environmental information to KOMO quality statements is in fact a logic step. Environmental standard figures are product characteristics and as such can be compared with other technical characteristics.

This project has recently begun and is subsidised by the Dutch government. The project will be finished around April 2001. The points of discussion mentioned here today will definitely be

taken into account in this project.

## **10. Expenses**

Because of the huge amount of information to be gathered, creating a LCA is a time-consuming task. The first complete LCA for one single product, when carried out by an extern institute specialising in LCA, costs 10,000 Euro at least. Also, the producer is the one handing in most of the information needed. This procedure is not very practical in environmentally oriented product development. It would be better to perform your own, in-house calculations. In the end this will be much cheaper for that one product. The calculation itself will not cost more than 500 Euro. If the gathering of information is done in co-operation with other producers, the total cost will remain at an acceptable level.

A critical note about individual and joint activities is useful. International or national co-operation is especially helpful in pre-production phases. The post-production phases (gate to grave) are best dealt with on a national level, although international feedback is always a good idea: Learning from the mistakes of others is also helpful. Of course, producers will be responsible for the listing of their own production phase. Since the listing is necessary for environmental permits, even in the production phase exchanging know-how, albeit on a slightly more abstract level, might be useful.

## **11. Conclusion**

Currently we are not in the midst of communicating environmental standard figures. However, our work so far has been very useful. We've gained a lot of experience and know-how, which we can use in discussions about procedures and methods for determination. More importantly, all participants are now able to optimise their products and processes, as part of product oriented environmental care. LCA allows producers as well as the entire industry to make strategic decisions with respect to environmental communication.

If you are thinking about communicating environmental standard figures on the basis of LCA methodology, then please consider the following:

- LCA is an ideal tool for product and process development. Try to keep as much know-how as possible in-house, especially for items for which you are responsible.
- It is relatively easy to link LCA methodology to cost calculating programs and integrate it in the ISO 14000 environmental care system.
- Environmental improvement can be profitable (for instance: packaging, energy type and energy use).
- Try to co-operate within a product group. Stimulate the suppliers of raw materials to actively co-operate and think along.
- If you wish to communicate environmental standard figures, you must first ensure that there are generally accepted procedures and criteria in addition to LCA methodology. This facilitates transparent and reliable environmental information.
- Do not act rashly when communicating environmental standard figures. First, gain experience with LCA and then set up a communication strategy.
- Initiate LCA projects within your own product group. Do not start with a comparison LCA involving competitive product groups.

I end this lecture with an appeal to all producers of bituminous roofing materials, including suppliers. Please take the listing and communicating of environmental standard figures seriously. And of course I would like to state that we would like to co-operate in as far as possible.

### **Bibliography:**

1. CML (Leiden), Novem, RIVM, Environmental life cycle assessment of products; 1992, Leiden;
2. Oorschot van G.F., Niemöller ing. L.G., stichting Dak & Milieu, Gathering environmental standard figures for bituminous roofing materials for the benefit of environmentally relevant product information (MRPI®), Zeist, March 1998;
3. Oorschot van G.F., AMPO, Towards a practical system for environmental profiles, Breda, 1998;
4. SNP, Manual for compiling environmentally relevant product information (MRPI®), Driebergen, 1998;

5. Stichting MRPI, Manual for compiling environmentally relevant product information (MRPI®), Arnhem, june 2000;
6. SNP, Background information for manual for compiling environmentally relevant product information (MRPI®), Driebergen,1998;
7. Stichting MRPI, Audit protocol MRPI, Arnhem,1999 ;
8. Stichting MRPI, Audit protocol MRPI, 2000, Arnhem;
9. LCA bituminous roofing systems, stichting Dak & Milieu, January 2000 (confidential).