

**NORDIC CO-ORDINATING
SYSTEM FOR
ENVIRONMENTAL
PRODUCT DECLARATIONS
(TYPE III)**

*Report from
the NIMBUS project
STØ.OR.20.01
ISBN 82-7520-425-9
Fredrikstad July 2001*

Ole Jørgen Hanssen
Heidi K. Stranddorf
Mie Vold, Cecilia Solør
Leif Hoffmann
Anne-Marie Tillman



| | | |
|---|---|--|
| Report no.: OR 20.01 | ISBN no: 82-7520-425-9 ISSN no: 0803-6659 | Report type: Research report |
| Report title: Nordic co-ordinating system for Environmental Product Declarations. | | Forfatter: Ole Jørgen Hanssen et al. |
| Prosjektnummer: 23 22 50 | Prosjekttittel: Nordic Project for Implementation of Environmental Product Declarations Type III in the Business Sector (NIMBUS) | |
| Oppdragsgiver m/referanse: Nordic Industrial Confederations Environmental Committee (Bjørn Sveen) | | |
| <p>Summary:</p> <p>The report summarizes the main experiences from the NIMBUS project, which has been carried out to co-ordinate activities within development of Environmental Product Declarations Type III in the Nordic countries. The report proposes a system with national EPD bodies, but with a co-ordinating body with representatives from the national organs. The main task of this organ is to co-ordinate development of Product Specific Rules, further development and implementation of methods, and to harmonize ned for competence by certification bodies.</p> <p>The report proposes that Nordic EPD Type III should have an indepent certification by an approved institution, but that companies can test an EPD in the market in one year before certification. An EPD which is approved and certified in one of the Nordic countries must be valid in all other countries (also outside the Nordic region) according to the general ISO principles.</p> <p>A communication study underlined the need for environmental information in purchasing, and that the information should be scientifically valid and comprehensive. For easy recognition of a Type III EPD in the market, it was asked for a common format where information is easy available and comparable.</p> <p>The NIMBUS project has developed a four page format for EPD based on an earlier Norwegian draft version. This format is proposed as a general format for Nordic companies, but without making the format mandatory for Type III EPDs.</p> | | |
| Emneord: * Environmental Product Declarations * Nordic co-ordination * Environmental Communication * EPD Format | Availability: This page: Open This report: Open | No of pages Incl. appendixes: |
| <p>Approved Date:</p> <p>_____</p> <p style="text-align: center;">Author</p> <p style="text-align: center;">(sign)</p> <p style="text-align: right;">_____</p> <p style="text-align: right;">Instituttstjef</p> <p style="text-align: right;">(sign)</p> | | |

Preface

This report is the main report from the Nordic Project for Implementation of Type III Environmental Product Declarations in the Business Sector (NIMBUS project), and describes recommendations concerning principles, methodology, organisations and formats for co-ordination and communication of EPD in the Nordic region. The NIMBUS project has been established by the Nordic Industrial Confederations, with the following representatives in the steering committee:

- Bjørn Sveen, Confederation of Norwegian Business and Industry (leader)
- Inger Strømdal, Federation of Swedish Industry
- Tina Sternest, Confederation of Danish Industries
- Sven-Olof Ryding, Swedish Environmental Management Council.

The following companies have been involved in the NIMBUS project, as case companies that have tested the principles and methodologies described:

- Norcem AS, Norway (contact person Erik Stoltenberg-Hansson)
- Portland Cement AS, Denmark (contact person Christian Justesen)
- Cementa AB, Sweden
- Norsk Hydro AS, Norway (contact person Jostein Søreide)
- Statkraft AS, Norway (contact person Tormod Schei)
- Elsam AS, Denmark (contact person Svend-Aage Jensen)
- Sydkraft AB, Sweden (contact person Maria Sunèr)

The NIMBUS project has been financed by the Nordic Industrial Fund, participating companies and Federations of Industries in Norway, Sweden and Denmark. The project has also been co-financed by other ongoing national and international activities.

This report summarises the main conclusions and recommendations from the project, and mostly directed to those who want an overview of the principles and organisation behind a co-ordinating EPD Type III system on a Nordic level. Those who are more interested in the detailed descriptions of the methodology, results from the study of environmental communication or the results from the case studies, must go to the reports described in the introduction.

On behalf of the steering committee and the project group we hope the report will be of value for the further discussions nationally, in the Nordic region and also internationally, in development of more co-ordinated, international standards for EPD. The report will be sent to a number of organisations in Norway, Sweden and Denmark, to have their expressions about the recommendations as a basis for further discussions about a Nordic co-ordinated EPD system.

We wish to thank all who have contributed with information: The member companies in CPM at Chalmers University, companies in the Danish and Norwegian EPD networks, participants in the seminars and last but not least, the company representatives from our case companies!

Bjørn Sveen, NHO (s)
Leader of steering committee

List of content of the report

| | |
|--|-----------|
| PREFACE | 1 |
| 1 INTRODUCTION | 3 |
| 2 ENVIRONMENTAL COMMUNICATION OF PRODUCT INFORMATION | 4 |
| 3 PRINCIPLES AND ORGANISATION OF A CO-ORDINATED EPD TYPE III SYSTEM IN THE NORDIC REGION | 6 |
| 4 CERTIFICATION PRINCIPLES AND METHODOLOGY | 8 |
| 4.1 INTRODUCTION | 8 |
| 4.2 PROPOSED NORDIC CO-ORDINATING SYSTEM FOR EPD CERTIFICATION | 8 |
| 4.2.1 <i>Principles for validation and certification</i> | 8 |
| 4.2.2 <i>Competence required by certification bodies/LCA experts</i> | 9 |
| 4.2.3 <i>Level of data certification - minimum requirements to review of LCA data</i> | 9 |
| 4.2.4 <i>Level of system certification</i> | 10 |
| 5 DEVELOPMENT OF PRODUCT SPECIFIC REQUIREMENTS (PSR) | 10 |
| 5.1 GUIDING PRINCIPLES | 10 |
| 5.2 PROPOSED NORDIC CO-ORDINATING PROCEDURE | 10 |
| 6 ENVIRONMENTAL PRODUCT DECLARATION METHODOLOGY REQUIREMENTS IN THE NORDIC REGION | 13 |
| 6.1 GUIDING PRINCIPLES | 13 |
| 6.2 PROPOSED NORDIC EPD METHODOLOGY | 13 |
| 6.2.1 <i>System boundaries</i> | 13 |
| 6.2.2 <i>Functional unit</i> | 15 |
| 6.2.3 <i>Allocation principles and rules</i> | 16 |
| 6.2.4 <i>Data quality requirements</i> | 16 |
| 6.2.5 <i>Environmental impact categories to be used in the Nordic EPD</i> | 17 |
| 6.2.6 <i>Assumptions and limitations of the LCA study</i> | 18 |
| 6.2.7 <i>Other aspects to be covered in the EPD system – Environmental Management Systems and Measures</i> | 18 |
| 7 ENVIRONMENTAL PRODUCT DECLARATION COMMUNICATION FORMAT | 20 |
| 7.1 GUIDING PRINCIPLES | 20 |
| 7.2 IMPORTANT ASPECTS TO BE COVERED IN THE FORMAT..... | 20 |
| 8 CASE STUDIES IN EPD DEVELOPMENT | 22 |
| 8.1 INTRODUCTION | 22 |
| 8.2 CASE STUDY ON PIPE LINES FOR SEWAGE TRANSPORT | 22 |
| 8.3 CASE STUDY ON ELECTRICITY PRODUCTS | 22 |
| 9 REFERENCES | 24 |

1 Introduction

This is the main report from the Nordic Project on Implementation of Environmental Product Declarations Type III in the Business Sector (NIMBUS). The project was established by the Norwegian Federation of Business and Industry (NHO), the Federation of Swedish Industries (SI) and Confederation of Danish Industries (DI) in the autumn 1999, based on recommendations from a pilot study in 1998 (Møller et al. 1998). The project has been an umbrella project for activities and projects being carried out in the Nordic countries.

The main goal for the NIMBUS project has been to:

"Promote *more ecoeffective products and services* in the Nordic industry through implementation, testing and further development of a common Nordic system for Environmental Product Declarations (EPD) based on ISO 14040-43 standards"

This report is based on five other reports, where four are developed in the NIMBUS project (I-V), and one (VI) in a parallel project on LCA methodology in relation to EPD. This project has been financed by Nordic Council of Ministers (NCM-project).

The reports from the NIMBUS project are:

- I. Hanssen, O.J. et al. 2001. Nordic Co-ordinating System for Environmental Product Declarations Type III. STØ Report OR.20.01
- II. Hanssen, O.J. et al. 2001. Systems and Methodology for Type III Environmental Product Declaration. STØ Report OR.21.01
- III. Solèr, C. 2001. User requirement studies to Environmental Information. CPM Report 2001:4.
- IV. Vold, M. et al. 2001. Environmental Product Declarations in the Concrete Sewage Pipeline industry. STØ Report OR.22.01
- V. Hoffmann, L. et al. 2001. Environmental Product Declarations in the Energy Sector. Report from dK-TEKNIK ENERGY & ENVIRONMENT 2001
- VI. Stranddorf, H. et al. 2001. LCA methodology in EPD methodology. Report from dK-TEKNIK ENERGY & ENVIRONMENT 2001

This report presents conclusions from discussions in the project group, based on inputs from representatives from case companies, the Nordic industry, LCA and EPD experts, and the Steering committee of the project. Development of a co-ordinated Nordic methodology has to be seen in relation to the overall goal in the "product oriented environmental strategy": To strengthen development and also competition based on Eco-efficiency and Eco-effectiveness of products. This goal can be achieved by improving the access to supplier specific environmental data.

As EPD Type III are intended to be used in purchasing processes to compare products from different companies, the EPD methodology and format must fulfil the minimum requirements put forward in ISO 14040-43 series for communications with external parties.

The report presents the following themes:

- Proposed principles and organisation of a co-ordinating system
- Common framework for Certification systems and methodology
- Common framework for the development of Product Specific requirements
- Common framework for EPD methodology
- EPD communication format

2 Environmental Communication of Product information

One important part of the NIMBUS project has been to gather experiences from and information about how environmental product information is used in the business to business communication in the Nordic countries.

The methodology that was used in the project was to carry out focus group meetings with representatives from industries and authorities in Denmark, Sweden and Norway, with open talks around the theme of environmental product information. The second approach was to use in-depth interviews with representatives from marketing, purchasing and environmental departments in companies and public sectors along three product value chains. Together, this gave the basis for making the following main conclusions and recommendations from the study.

Declarations of contents providing information on the chemicals content of products are to be mandatory in a common Nordic EPD system. There is support for this suggestion in recent literature in the field. (Naturvårdsverket 1999; Jönsson 2000).

It is important to close the gap between the supply and demand of environmental information. The mismatch between the kind of environmental information producers supply and the information corporate customers need (Jönsson 2000) is represented in this study as differences in how senders and receivers understand environmental information. Within a common Nordic EPD system efforts must be made to overcome this problem by;

- a. investing in information activities aiming at bringing corporate customers/receivers closer to the position of producers/senders, and
- b. investing in describing the information needs of corporate customers/receivers before formulating product/sector specific requirements, aiming at bringing producers/senders closer to the position of receivers.

Information activities within a common Nordic EPD system should have the purpose of educate users about the system as such, as well as about LCA methodology and use. Information about the system includes the spreading of knowledge concerning aims of the system, procedures, certification, trustworthiness, possibilities to influence the system etc. It includes a description of the subjective elements of EPDs. Information about LCAs includes simplified descriptions of parameters and environmental impact categories in relation to effects on health and the environment. It also includes descriptions how to use an EPD for the purpose of comparing the environmental performance of alternative products, (which is built on the assumption that average values or threshold values are included in EPDs). The information suggested here should provide users with enough knowledge to answer the questions; What is an EPD? What does EPD related information mean?

Information activities should preferably be the responsibility of a Nordic counterpart to Svenska Miljöstyvningsrådet. Information activities should be more active than merely updated information on the internet. Information packages for specific groups, i.e. salespeople are recommended, as well as instruction packages for key users responsible for EPD information.

The description of customer information needs should aim at systematically mapping out the kind of information customers within given industries require in order to use EPDs for comparative purposes. There exist within the Swedish EPD system some activities (stakeholder meetings) aiming at the establishment of support of different actors before the adoption of PSR, product specific requirements (Miljöstyvningsrådet 1999). Within a common Nordic EPD system it is recommended that IND, information need descriptions are made mandatory as a preparatory step before the establishment of PSR. These IND should aim at collecting data from different groups of customers representing both public interest, the business community, different organisational size etc. Such systematic descriptions will be a safeguard against the risk that only the opinions of a number of big and environmentally concerned customers are reflected in the PSR and the format of sector specific EPDs. INDs will increase the probability for EPDs to be a useful and efficient tool *promoting more ecoeffective products and services* as stated in the aim of the Nimbus project.

The possibility for users to compare the environmental performance of products and services on the basis of EPD information must be facilitated. In order to facilitate comparisons the EPD format must be made as user friendly as possible. Except for the inclusion of declaration of contents (which is discussed above) this means that;

- a. Average values for specific product groups in relation to different environmental impact categories/parameters and/or threshold values, visualised if possible, are included in EPDs.
- b. Clarification/visualisation of the relativity of environmental performance in relation to phases of the life cycle are included in EPDs.
- c. A common layout format should be established with sector specific possibilities to make company specific comments of a subjective character under separate headings or in appendices.

The Norwegian EPD format to a large extent corresponds to the recommendations concerning a common layout format and the clarification/visualisation of the relativity of environmental performance in relation to phases of the life cycle. The four-page format provides room for visualised information, the headings are clearer, and easy-to-find, than those found in Swedish certified EPDs.

3 Principles and organisation of a co-ordinated EPD Type III System in the Nordic region

This report proposes a system with national, formal Environmental Product Declaration Type III (EPD) program owners, with a co-ordinating organ as an umbrella on the Nordic level (Figure 1).

It is important to develop and market the EPD Type III system as a valuable alternative for companies, and to make the tool known for those companies. This is better done on the national level than on an international level, indicating the need for national bodies. It is also better to develop and operate a system with approval of validating institutes on a national level, where there are more knowledge about capacity, experience and practise in consulting companies. The principle organisation model is presented in Figure 1.

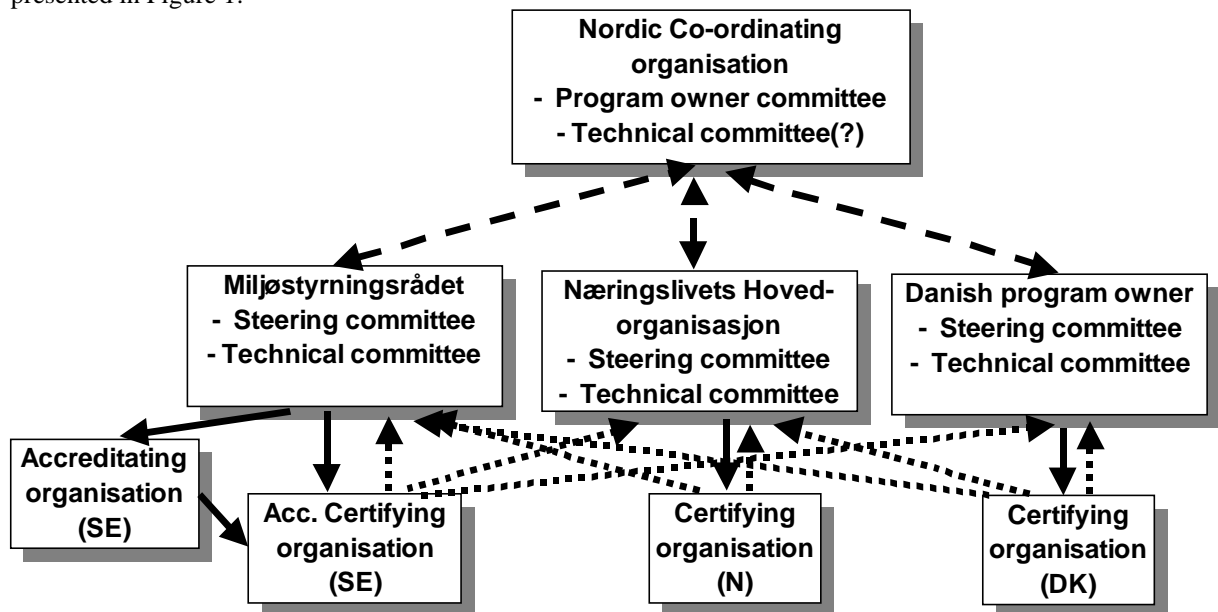


Figure 1 Principle model for the organisation of a Nordic Co-ordinating System for EPD

On the other hand, it is very important to develop further EPD methodology, format for communication, requirements to experience and knowledge by certification personal and especially Product Specific Requirements (PSR's) on a higher geographical level. The main reason is to be sure that products from different producers and countries within functionally similar product groups, are comparable on a common basis. This can only be done through harmonisation of EPD methodology and PSR's for different product groups, independent of where they are produced. There is thus an obvious need for co-ordination and harmonisation between countries in further development and specifying the EPD System. This does however not say that co-ordination and harmonisation have to be done by a formalised, international body.

It is also an important question if the Nordic region is a natural unit for many of those companies and products that are relevant for being EPDs. A lot of large and medium sized Nordic companies have as much economic relations to other countries in Europe, as to other Nordic countries. A Nordic system could thus easily be too narrow for those companies, if they are to have some benefits from international collaboration about EPD certification and registration. A more ideal unit for collaboration would thus be EU for most Nordic companies. However, there are conditions within the Nordic region that makes it easier to collaborate within the region than with other regions being involved. The Nordic region is also a good platform for development and testing of methodologies that in the next step can be implemented on a more international basis.

It is proposed that a Nordic Co-ordinating System for EPD should be based on a well defined minimum level for sufficient validation and certification in the Nordic countries. This means that different countries can choose different types of systems for validation and certification of EPDs, as long as the minimum requirements in the ISO 14025 Technical Guideline are fulfilled. These minimum requirements are presented in Chapter 4.

It is proposed as a principle that EPDs shall be registered in the country where the producers have their business address. Certification institutions shall also as a general principle be approved or accredited in the country where they have their business address. However, when an EPD is approved in one country with a Type III system, it must automatically be valid in all other countries with Type III systems. Similarly, when an institution is accredited or approved as competent to certify or approve EPDs in one country, it must automatically be approved as validating organisations in all other countries. These are very important principles for the EPD system to be effective over a larger geographical area.

To increase the interest for EPD Type III in the industry and motivate for increased use in the market, it is proposed to have as a possibility to use uncertified EPD's for a *limited* time period of *one year, with a possibility for prolongation to two years if there are special reasons to consider*. Companies that are interested in EPD's, but uncertain about the value of such declarations in the market, are allowed to develop and use an unregistered EPD. Such uncertified EPDs must be based on the general methods and the specific methods described in a PSR and the quality requirements to persons developing the EPD. The national program owner should have a special list of such uncertified EPD's, not to be mixed with those that are certified by a third party. Those EPD's will thus not be approved according to ISO 14040-43 and ISO 14025, which must be stated in the EPD and the register.

4 Certification principles and methodology

4.1 Introduction

The most important aspects to be covered in the co-ordinated Nordic EPD methodology are:

- Overall set up of quality assurance system, with focus on how to deal with necessary credibility, transparency, comparability and additive properties of EPD's
- Competence required by certification bodies/LCA experts
- Level of data certification - minimum requirements to review of LCA data
- Level of EPD certification
- Guideline on performing data control
- Guideline on performing system control

Existing technical reports like ISO TR 14025, standards like ISO 14040-43 combined with national experience will be used in the development of the Nordic methodology framework for certification of environmental product declarations.

Accreditation and certification can be components in the quality assurance procedure of an environmental product declaration program. *Certification* is the procedure in which an independent organisation performs a verification of LCA data and certification of the system i.e. certification of the declaration and presentation of data in accordance with the methodological requirements and guidelines. *Accreditation* is the process of controlling the certification organisation/procedure. The certification organisation that has proved to be able to follow the prescribed procedures can get an accreditation. The organisation will be an *accredited certification organisation*.

There are a number of possible solutions to fulfil the requirements to approval of an EPD according to the ISO 14025 Technical Guideline (see Hanssen et al. 2001).

The Nordic Co-ordinating System for EPD requires a kind of certification system, firstly to fulfil the requirements in ISO TR 14025, and secondly to ensure high credibility among users of the EPDs. However, it is also important that the system not makes too strong barriers to companies that are interested in development of EPDs.

4.2 Proposed Nordic Co-ordinating System for EPD certification

4.2.1 Principles for validation and certification

It is proposed that a Nordic co-ordinated EPD system should follow the following set of principles as *minimum* requirements:

- The EPD must be verified by a third party institution that is approved by the national program owner according to requirements to experience and knowledge with LCA and EPD
- The institution that have assisted a company in carrying out the LCA and the EPD, *can not in the next hand approve or certify the EPD from the same company*
- An EPD that is certified in one country must automatically be valid in all other countries. The certification bodies shall both verify that the LCA study conforms with the generic methodology and the PSR, and that the EPD reflects the outcome of the LCA
- Institution/person approved or accredited for certification in one country is automatically approved in all other countries
- The certified EPD must be reassessed within a certain time period to be valid (e.g. years) or when there are changes in the product system that will influence significantly the outcome of the LCA study. Each company has a responsibility to inform the certification body and the registration body about changes that will influence the EPD profile in the period between certifications.

Each certification body has to document experience and knowledge according to specific requirements to knowledge and practise with LCA methodology in certification body. An EPD can cover a group of products from the same producer and be certified for a group of products if the variety within the product group for any important impact category is less than what has been specified in the PSR.- It is

proposed to establish a possibility for companies to use unregistered EPDs in one year before they are certified by an independent institution.

4.2.2 Competence required by certification bodies/LCA experts

The competence requirements to the certification bodies as well as to the LCA experts are described below. The requirements to the certification body is almost similar to the competence required for certification of environmental management systems or quality management systems whereas the requirements to the LCA experts are more technical. The LCA expert can be employed by the certification institution itself, or be hired for the specific task from another, independent institution with such expertise.

Certification bodies

The competence required for the certification bodies are:

- Documented knowledge of environmental product declaration methodologies/standards (ISO 14020 and ISO TR 14025)
- Documented knowledge of environmental management and quality management systems
- Available expertise in LCA according to requirements shown below, either in own organisation or in collaboration with other organisations
- Skills in certification procedures

LCA experts

The competence required for the LCA experts to certify an EPD is:

- General knowledge on environmental matter in industry and product related questions, and education from University level in relevant areas.
- Documented knowledge of and minimum 2 years experience with LCA methodologies in project work
- Documented knowledge of LCA standards (ISO 14040-43)
- Documented knowledge of environmental product declaration methodologies/standards (ISO 14020 and ISO TR 14025)
- Product and process knowledge for the relevant product group

4.2.3 Level of data certification - minimum requirements to review of LCA data

The first part of the certification procedure is data verification. The data required for making an environmental product declaration have to be provided by making an LCA. The LCA can be made with the purpose of making a declaration or the LCA can be made with other purposes. ISO 14040 describes the content of the *critical review*:

The methods used to carry out the LCA are consistent with this International Standard;

- *The methods used to carry out the LCA are scientifically and technically valid;*
- *The data used are appropriate and reasonable in relation to the goal of the study;*
- *The interpretations reflect the limitations identified and the goal of the study;*
- *The study report is transparent and consistent*

An LCA made with the purpose of generating input for an environmental product declaration is obviously not for internal use as the declaration is intended for comparing environmental performances for comparable products. Therefore, the requirements to the critical review to be performed at an LCA for environmental product declarations is proposed to be in accordance with the same principles for comparative assertions.

This requirement may be in conflict with the interests of the companies making EPDs. The need for involving interested parties can be solved in the procedure of making PSR, as all interested parties will be invited to participate in the process of agreement of PSR for the specific product group. Especially agreement on system boundaries and allocation rules are crucial for acceptance of the PSR and EPDs. The methodological considerations that have to be decided upon in the procedure of developing the

product specific requirements replace to a certain degree the methodological choices in performing the individual LCA. This aspect may be used as argument for less strict requirements to the critical review.

Although the LCA report is *critically reviewed* by independent LCA-experts, additional verification is necessary to verify that the LCA has been done in accordance with the general EPD methodology and PSR. This data verification is proposed to be done by independent LCA experts. Involving independent LCA-experts is necessary in order to maintain the credibility of the declaration.

4.2.4 Level of system certification

The second part of the certification procedure is system certification. The system certification is proposed to include:

- Control of the selection of data including assumptions etc. and the presentation hereof at the declaration
- Control of the fulfilment of the general requirements to environmental product declarations

5 Development of Product Specific Requirements (PSR)

5.1 Guiding principles

The ISO 14040-43 standards describe the general principles or requirements for the LCA study. These standards guarantee that the same basic principles have been followed for the certified environmental product declarations for all product groups and service types even though the standards allows a certain flexibility in the definition of system boundaries etc.

The general principles or requirements in the ISO standards should be followed as far as possible in the Nordic EPD Type III System and deviations and special conditions should be stated in PSR.

To be sure that the EPD system compare homogenous groups of products, it is important to specify criteria for which products belongs to a given group. The product specific requirements (PSR) shall contain a good description of which types of products, services or constructions that are included in the product group, to be sure that products that are compared are within a homogenous group.

5.2 Proposed Nordic co-ordinating procedure

The work to develop PSR for a product group or service must be done as a co-operation between manufactures importers and representatives of industrial, branch organisations and other stakeholders to ensure objectivity, credibility and comparability between declarations within product group or service type. It is important that this work is co-ordinated on a Nordic level to reach a broad consensus, i.e. securing comparable environmental product declarations in the Nordic business region.

Figure 2 illustrates a method or a process system when developing PSR for a product group or a service. Interested parties include customers, users, relevant producers, branch organisations, authorities etc. (cf. ISO 14025).

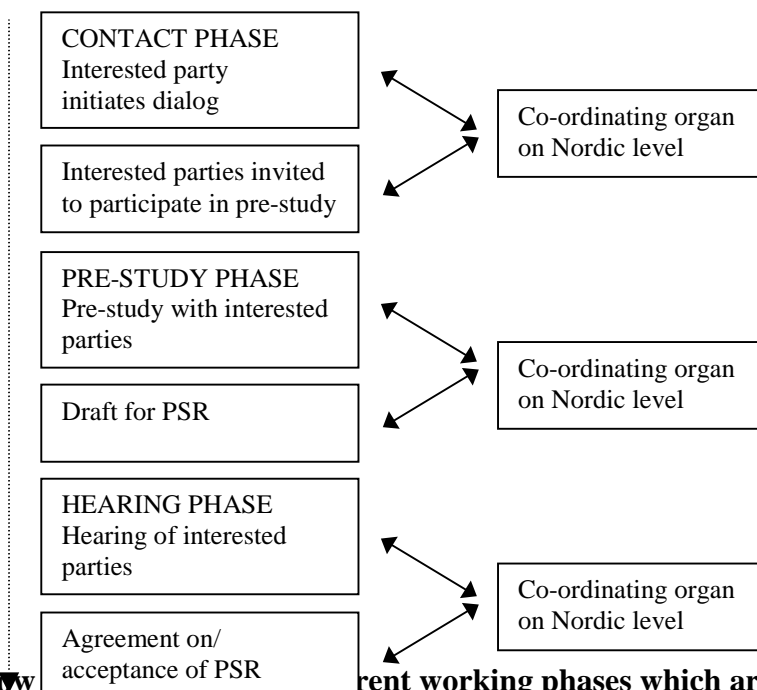


Figure 2 Flowchart of the present working phases which are needed when developing PSR for a product group or service.

A Nordic company initiates the system or process of developing PSR for specific product groups.

In general, it is the Nordic business sector that defines the PSR and proposals for PSR are prepared in co-operation between the all interested parties in the Nordic business sector. To ensure that all interested parties are informed and committed an independent organ co-ordinate the work. This organ, which has knowledge of the ISO 14040-43 standards, ISO 14020 and ISO TR 14025, contributes with all necessary expertise during the work securing that the PSR are developed according to the standards.

The need for co-ordination and broad acceptance in the market for EPD Type III has to be balanced with the need to let companies that are in front of development within environmental communication be able to use EPD's. As is the case in Sweden and Norway, it should be possible for single companies to bring the process with development of PSRs forward to the hearing phase in parallel with development of the initial EPD. This is the case if no other companies are motivated to participate in the development phase after an open request from the national program owners.

Contact phase

The purpose of the contact phase is to gather all interested parties in the Nordic business sector in the discussion and developing of PSR for the relevant product or service group.

The individual company that wish to start a process of preparing PSR for a relevant product or service group, contacts the co-ordinating (Nordic) organ or secretary. The organ invites this company and other Nordic companies in the same business, together with representatives of industry-, branch- and interests organisations, to participate in the preparation of a proposal for PSR. If no other companies express interests in the process of preparing PSR for the product group, the company can proceed alone in parallel with development of the EPD.

Pre-study phase

The purpose of the pre-study phase is to compile relevant LCA studies or perform an LCA study for the product group or service. Secondly, the purpose is to discuss and develop a draft-set of PSR for the relevant product or service group.

The invited parties initiate the work of preparing a draft for PSR. In this phase the co-ordinating organ gives consultants according the ISO 14040-43 standards and prepares meetings and final draft for PSR.

Hearing phase

In this phase the PSR are open for comments from interested parties in the Nordic business sector to ensure a broad and general acceptance in that field as a whole.

Acceptance and approval phase

After the coordinated hearing phase has been carried out, the national EPD program owners must approve the PSR for use nationally. It is important in this phase, that no changes are made according to the co-ordinated agreement.

6 Environmental Product Declaration methodology requirements in the Nordic region

6.1 Guiding principles

The Nordic EPD methodology is based on the programmes already established in Sweden and Norway, and the ISO 14025 Technical Guideline. The methodology should be as comprehensive and general as possible, leaving out as little as possible to the Product Specific Rules. There should be as little room as possible for optional methodological choices, making comparisons between different functional equal products as easy and justified as possible.

An EPD Type III shall be based on Life Cycle Assessment (LCA) methodology, where the LCA studies should be carried out according to ISO 14040-43 standards. The methodology described in this document is based on the Swedish and Norwegian EPD Type III methodology documents (Miljöstyvningsrådet 1998, 1999, Hanssen et al. 2000). The LCA that forms the basis for an EPD Type III shall be retrospective with respect to use of data, i.e. that the data originate from average data related to a specific period of time (see possible exception in section 6.2.2).

As the ISO 14040-43 standards set very strict limitations to the use of LCA for external comparisons between products, it is important that the supplier do not give such comparative information in an EPD Type III. An EPD must thus not contain comparative assertions between the suppliers of a product and competitors product. A supplier might however present comparative assertions between own products, for instance a new solution compared to earlier reference products from his own portfolio.

In the EPD methodology and presentation of data, it is important to make a split between the production of materials, components and products in the manufacturing industry and the user phase and end-of-life waste management phase of the same products. The reason is that it is more difficult and higher uncertainties related to environmental aspects related to the use of products and waste management of products. Environmental profiles for these phases should reflect the market situation for the product.

The validating or certification body will be responsible for checking that these methodological aspects have been followed. The proposed requirements for dealing with these methodological aspects are presented in the following chapters.

6.2 Proposed Nordic EPD methodology

6.2.1 System boundaries

System boundaries is defined as the separation of the product system in the EPD Type III from other product systems and from natural systems. The most important aspects to be covered in definition of system boundaries are

- geographical influence area of the product
- time dimension of products and impacts
- separation from other related product systems
- which stages of the total life cycle which is included in the study
- which cut-off rules which are used for practical data gathering reasons
- separation between technical and natural systems.

General rules for definition of system boundaries are given in ISO 14041, and those rules should as a general principle be used in definition of an EPD Type III:

The following specific rules are proposed to be used in the Nordic Co-ordinating System for EPD:

- ◆ What parts of the life cycle that is included in the EPD must be clearly shown in a product tree diagram

-
- ◆ The production phase and the use phase/end of life phase of the EPD must be clearly separated in the reporting of data in the EPD. To represent the use phase and end-of-life phase of products in an EPD Type III, one or more typical applications for the relevant product-market situation and end-of-life scenarios can be presented in the EPD. Specific assumptions for a typical use phase should be stated in the PSR for the product group.
 - ◆ Environmental impacts related to establishment of infrastructure constructions and capital goods can in general be excluded from EPD's for products at the present state, due to lack of representative data. If there is documentation that such impacts might have a significant contribution to the total impacts of a product system, the PSR should require that these life cycle stages are included.
 - ◆ Transport of employees from home to the working place, and other personal related activities (e.g. eating) shall in general not be included in the EPD.
 - ◆ Emissions from waste deposits can be excluded from the EPD at the present state, due to lack of reliable models and data. Emissions and waste generation related to wastewater cleaning plants shall in general be included in the EPD data.
 - ◆ It is proposed that emissions from waste recovery including collection and transport of waste, recycling and incineration shall in general not be included as part of the system where the waste originate, but shall be allocated to the user of recycled materials or recovered energy. This is in agreement with the Swedish system concerning materials to be recycled. The final conclusion concerning energy recovery will be dealt with in the NMR report.
 - ◆ Material and energy flows leaving the system as waste must be accounted for in a specific waste declaration part of the EPD. Only waste flows from producers that are part of a voluntary or mandatory waste management systems (e.g. take back system, vending system or recycling scheme) can be shown up as recovered or recycled beyond the level of average, national recycling figures. These aspects will also be dealt with in more detail in the NMR report.
 - ◆ In general, at least 98 % (based on total mass) of all material input to a given life cycle stage of a product should be represented with process related emissions from their total life cycle. Emissions of specific toxic substances or hazardous chemicals given in lists from international authorities (EU Directive 67/548/EEC or mentioned on the "List of dangerous substances" EU Directive - http://europa.eu.int/eur-lex/en/lif/dat/1998/en_398L0098.html) or in national lists of dangerous substances, must be included in the EPD, also from processes where other emissions are omitted through the cut-off criteria. Any deviations from such list must be documented in PSR (cf. chapter 6.2.5).

These general rules are summarised in Figure 3

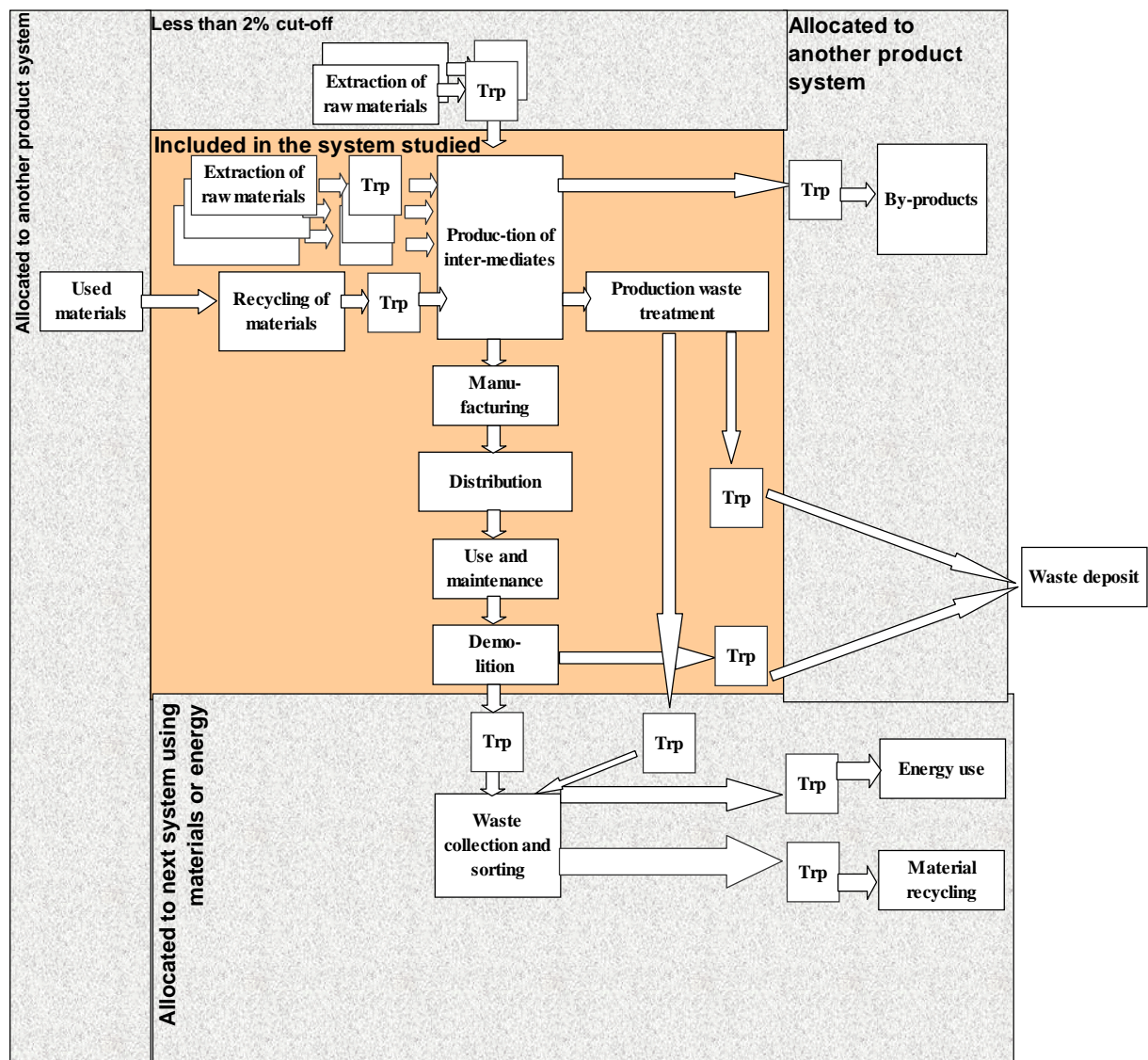


Figure 3 Principle definition of system boundaries for product systems in Nordic EPD methodology

The following subjects shall be defined in the PSR when they deviate from the general rules:

- ◆ The part of life cycle that should not be included in the EPD for the product group must be clearly defined in the process tree diagram. The reasons for the exclusion(s) must be explained in PSR
- ◆ If the cut off of process related emissions from a given stage of the life cycle can exceed 2% of the total emissions of that life cycle stage, the reasons for this excess must be explained and justified.
- ◆ Specific toxic substances or hazardous chemicals which is not given in the general list of the EPD methodology must be listed.

6.2.2 Functional unit

The functional unit is important as a basis for making relevant and fair comparisons between products in relation to how effective they fulfil one or a number of user demands. The functional unit will be the basis for estimating the reference flow of products, utility materials, energy etc. to fulfil the user requirements.

In the Nordic EPD Type III system, the functional unit should be:

- ◆ For raw materials and intermediate products and components, the FU should be identical with the reference flow, eg. 1 ton of cement, 1 m³ of concrete, 1 MJ of natural gas etc.
- ◆ For products with a number of different applications, it may be useful to use one unit of the product as the functional unit in an EPD Type III system (e.g. a 1 l plastic bottle, 1 m of foundation wall, 1 m of sewage pipeline etc.).
- ◆ For end products, the FU shall as far as possible reflect how user demands are fulfilled by products, based on life time expectations, user efficiency, fulfilment of more than one function etc. In most cases, it is only possible to relate this to a given application of a product. Such a "standard application" should be defined through a reference case in the PSR and be used as a common calculation basis for all products within the product group

The following aspects should be considered in determining the functional unit:

- ◆ The life time dimension
- ◆ The functional efficiency of the product solutions
- ◆ Multi-functionality must be covered in definition of the functional unit.

The functional unit must be clearly defined for all product and service alternatives in the specific requirements for product groups (PSR).

6.2.3 Allocation principles and rules

Allocation principles will in many cases influence significantly on the EPD results. The general principles is described in ISO 14041, and should be followed as far as possible in any EPD system. Any deviations should be stated in the general EPD methodology or in PSR.

The following allocation principles are proposed to be used in the Nordic EPD-system:

- ◆ As far as possible, allocation between systems should be avoided.
- ◆ In allocation of between products in multi-output processes, the share of economic turnover between products should be used as the general principle.
- ◆ Allocation of burdens from waste treatment systems should be based on physical causality of the materials
- ◆ No allocation is performed for open loop recycling (cf. chapter 6.2.1)
- ◆ System boundary expansion as an alternative to allocation is not allowed to be used in the LCA studies.

In the product specific requirements (PSR), allocation principles should be described and justified, and especially if the allocation principles deviate from the general EPD requirements

6.2.4 Data quality requirements

To be able to compare different products through the use of EPDs, it is necessary that the two data sets are relevant, up-dated and with good quality. Rules for data quality management in LCA studies are found in ISO 14041, and should be used as general guiding principles for EPDs. In addition, the following rules are given for EPD development in the Nordic countries:

- ◆ Specific data from suppliers involved in the product system to be declared should be used as far as possible in the producer part. General data should be used when they are the most relevant. In general, up to 20% of the impact values accounted for in the EPD may be based on generic data as substitute for specific data.

-
- ◆ In all EPDs, the proportion of materials being represented by general data must be given. Within a period of 3 years, the supplier must justify the reasons for not fulfilling the requirement of maximum 20% generic data, to get the EPD approved for a new period.
 - ◆ For electricity (and natural gas) data, supplier specific data should be used for electricity being regulated through contracts, based on economic transaction data. For electricity sold to or bought from the general electricity pool, average data for a representative unit of producers should be used.
 - ◆ LCA data shall represent average figures from the basis year of the EPD as far as possible. Marginal data shall in general not be used as a basis for EPDs.
 - ◆ If material data are used from a number of suppliers, a weighted average of the environmental burdens related to each producer should be used as representative data.
 - ◆ Data from the user phase and end-of-life waste treatment should be representative for the market area and the relevant functions which are stated in the EPD for the product. Such data should as far as possible be verified by independent test programmes as further specified in the PSR.
 - ◆ It must be possible for the certification body to go back into the LCA study, and find data about the assumptions done in the LCA which are important for the EPD. Data should as far as possible be represented in a format according to the draft international standard ISO 14048 for data quality.

The Product Specific Requirements shall define:

- An acceptable level of generic data and the source of such data for the given product type if it deviate from the general methodology
- If the level of maximum 20% of impacts being related to supplier specific data is allowed to be exceeded.. The factors lowering the data quality must be explained

6.2.5 Environmental impact categories to be used in the Nordic EPD

In the Nordic Co-ordinating System for EPD, valuation and normalisation of impact indicators shall not be used to present impact indicators in the format.

In the Nordic Co-ordinating System for EPD, it is proposed to use the same six impact categories as used in the Swedish and Norwegian EPD systems as a basis:

- Global warming
- Stratospheric ozone depletion
- Acidification of land and water sources
- Photo-oxidant formation
- Nutrient enrichment

To develop impact indicators, it is important to use the same characterisation factors in all EPD's. It is proposed to use the same characterisation factors as the Swedish EPD system.

In addition, important toxic substances and hazardous waste from the product or the production processes of the product, should be given in the EPD.

Input of the following resource categories should be quantified in the EPDs:

- Energy resources
 - Material resources
 - Area resources
 - Water resources.
- ◆ Regarding area resources and water resources, both the quantitative and the qualitative aspects of resource depletion (type of area, type of water source) should be considered as far as possible. It must be considered if an impact in an area should be considered as a continuous and irreversible or as a single event with

limited impacts. At present state, the last two categories might be excluded in EPD development, until better data and models are available.

- ◆ Energy resource consumption shall be quantified within the following subcategories in the EPD:
 - Fossil energy resources
 - Renewable energy resources (solar based energy carriers)
 - Uran for nuclear energy
 - Energy from waste incineration.
 - In all EPDs the heat value that has been used for the different energy carriers being used in the system, must be given

- ◆ For material resources, the following subcategories of resources should be used in the EPD:
 - Renewable resources
 - Non-renewable resources
 - Recycled materials.

The product specific requirements (PSR) should specify

- The use of specific impact categories (those not listed in the general EPD rules) must be described and characterised
- The use of other resource categories than those listed in the general EPD rules must be described and characterised
- The use of other subcategories than *Renewable and Non-renewable* must be described and characterised

The content of or process emissions of toxic chemicals or other hazardous substances relevant for the product group should be identified and listed, according to the criteria defined in EU Directive 67/548/EEC or mentioned on the "List of dangerous substances" EU Directive (http://europa.eu.int/eurlex/en/lif/dat/1998/en_398L0098.html, or in national lists of dangerous substances).

6.2.6 Assumptions and limitations of the LCA study

Any assumptions and limitations affecting the LCA study other than those inherent to the EPD system must be described.

6.2.7 Other aspects to be covered in the EPD system – Environmental Management Systems and Measures

The EPD shall have a list of content of materials in the product.

Documentation of the status of Environmental Management Systems (EMS) by companies being involved in the product chain of the EPD system, could be an important additional information in many cases. EMS might be an important basis for continuous improvements by the suppliers to the producer of the product. Inclusion in the EPD system might be an important driving force for spreading of EMS systems in the Nordic industry.

It is proposed that the Nordic Co-ordinating System for EPD could include information about:

- How large share of the specific suppliers in the product system which have a certified EMS or are in the process of development such systems (at least those suppliers which contributes to more than 5% of the total value of the product).
- How large proportion of raw materials and services that have their own EPD.
- If the company is part of a voluntary recycling scheme or have introduced take back agreements for their products or their packaging.

- New measures that are planned to be introduced or that are under development for improving the environmental performance of the company. If this information is to be certified, an implementation plan decided upon by the management of the company has to be shown up.

The PSR should give more specific recommendations for what aspects should be included for given product groups.

7 Environmental Product Declaration communication format

7.1 Guiding principles

The way EPDs are communicated from a sender to a receiver is crucial for the understanding and use of environmental information in the marketing and purchasing processes. It is important that certified EPD's are easy for customers to recognise and to compare with other EPD's. To make it easier to compare EPDs for different products, it has been proposed to have one common format for all types of EPDs. The format is closely related to the methodology, as all outputs from the methodology presented in chapter 6, should be found in the communication format. This format is not mandatory for use by companies in the Nordic region, but will be an offer to simplify the development, use and recognition of the Nordic EPDs.

The following elements must thus be included in an EPD Type III format, to be a "stand-alone" document presenting the LCA results in accordance with ISO 14040:

- The functions delivered by the product system
- Choice of functional unit
- A description of the product system which is studied
- The system boundaries used in the LCA study
- Allocation principles which have been used
- Which impact categories have been used, and which methods have been used to estimate contributions to specific impact categories
- Data quality requirements to be used
- Assumptions and limitations which the LCA study is based upon
- Type of validation or critical review used in the study

It is proposed a format with 4 pages which should in general be a standard for EPD presentation (see Appendix). The content of this format as shown below (Chapter 7.2) should be the minimum standard, with possibility to increase the text with company and product specific information, or with non-declarable information about the user phase and end-of-life phase of products. Still, the format should be within a limit of 6 pages, with a common front page.

7.2 Important aspects to be covered in the format

The items of information that shall be included in the EPD format can be divided into the following chapters.

1. A common front page with information about the company, the product and the EPD
2. A list of content of materials in the product, with information about origin of data
3. Use of natural resources
4. Use of energy resources
5. Environmental impacts
6. Waste treatment
7. Description of system included and allocation rules
8. Reference to background data
9. Additional information about the user phase and end-of-life phase of the product based on simulations according to conditions specified in PSR of the product group.
10. Information about the status concerning environmental management systems, participation in voluntary systems etc. of the company and its suppliers.

The user phase is often the most variable and unpredictable phase in the environmental profile of many products, making it difficult or impossible to *declare* the environmental profile. For many products, the user phase is however the most important part of the life cycle, and differences in user efficiency between different products might be the most important factor to consider. It is thus proposed a solution where a given *reference case* can be defined in the PSR's for each product group, to be used as the common calculation basis for simulating the environmental profile of the user phase and end-of-life phase of each product. Information about product properties which are of importance for the simulation (e.g. energy insulation properties, noise insulation properties, tearing properties etc.) must

be given in the EPD. In some cases, these figures can be declared through standardised tests. It must be clearly stated in the EPD format, that the given environmental profile, only is valid under the assumptions given for the reference case in the PSR, and that each user has to consider alternatives under specific requirements to the product.

The draft communication format for an EPD for raw materials and for final products is shown in Appendix A. The format will be available for use by Nordic companies through contacts with the national program owners.

8 Case studies in EPD development

8.1 Introduction

Through the NIMBUS project, two case studies have been carried out to test the idea of co-ordinated development of PSR and EPD within industrial sectors, and to test the methodologies and format for communication. The two case studies have been carried out on

- large pipe lines for transport of sewage water to waste water treatment plants (concrete products)
- electricity products.

The experiences and results from these case studies are briefly presented in the following chapters, and in more detail in the two case study reports.

8.2 Case study on pipe lines for sewage transport

This case project focused on large pipelines for sewage distribution into sewage treatment plants. Three producers of concrete pipeline systems were invited to participate in the project by the cement companies Norcem (Norway), Aalborg Portland (Denmark) and Cementa (Sweden). Most of the work was carried out in Denmark and Norway, with STØ as project manager. Data from the two pipeline producers were compared with Swedish data being available from an earlier project carried out by Chalmers Industri Teknik (CIT) some years ago.

In the case project, draft Product Specific Requirements (PSR) has been developed for sewage distribution pipelines. In addition, EPD's have been developed for pipe line systems from the Danish, Swedish and the Norwegian producer.

One of the key discussions in the EPD development, were what to use as the functional unit, and if the total life cycle of the pipe line should be included or not. The conclusions were that a functional unit of 50 m pipeline system used and maintained over 100 years life time was the best alternative. In the EPD, additional information will be shown in a diagram, where the life cycle energy pattern is given. The main reason is to show the relationship between energy consumption in the production phase, compared to energy consumption in the user phase (especially pumping energy). The challenge to develop this life cycle energy pattern, is to define a set of technical standard settings all producers must use to calculate product or material specific consumption data.

So far in the project, the draft PSR has not been distributed outside the project group for comments, neither nationally nor on the Nordic level. This will be done after the project has been finished, and the experiences from this part of the work must be gained in a following-up of the project. The EPD's have so far not been tested in the market, so experiences with how to use the EPD's in decision processes on a Nordic level must also be dealt with in the next phase.

8.3 Case study on electricity products

The second case study carried out as part of the NIMBUS project was focused on electricity products. The project group had representatives from ELSAM AS in Denmark, Norsk Hydro and Statkraft AS in Norway and Sydkraft AS in Sweden. Sydkraft had already made their first EPD for Swedish Wind Power, and had also developed PSR for electricity production that was approved in the Swedish EPD system together with Vattenfall. Sydkraft did thus not develop a new EPD in the NIMBUS project, but participated in the project group meetings where the PSR was discussed.

All the data available from the Norwegian and Danish cases had been gathered in national, company-internal projects before the NIMBUS project was initiated. One problem in the project was thus that the data were confidential when the project started, and that the specific EPD development could not start before August 2000. ELSAM's data set consisted of average data from their total production and import of electricity for use in Denmark. The Norwegian data set was from 7 hydro power plants in

Norway, with a representative distribution of different power stations (river plants, large dam plants etc.).

The most interesting question was if the Swedish PSR for electricity production could be used as a basis for Nordic EPD's, or if the data sets from Norway and Denmark were too different in their assumptions and methodologies. The discussions in the project group clearly showed that the Swedish PSR more or less completely could be used as a basis for the Norwegian and Danish data set, and that this PSR could be recommended as a common Nordic platform. The important experience is that a PSR developed in one country, with few if any modifications can be used in a larger region.

The EPD's for Danish and Norwegian electricity have not either been tried systematically in the market yet, and experiences from use in decision situations must be gained in a following-up activity.

9 References

- Hanssen, O.J., Vold, M., Økstad, E., Borchsenius, C.H. & Askham, C. 2000. Miljøvaredeklarasjoner Type III. Forslag til etablering av norsk system basert på forprosjekt med syv norske bedrifter. Stiftelsen Østfoldforskning OR.02.00.
- Hanssen, O.J., Stranddorf, H.K., Vold, M. & Hoffmann, L. 2001. Systems and Methodology for Type III Environmental Product Declaration. *Østfold Research Foundation OR.21.01.*
- Jönsson, K. (2000). *Communicating the Environmental Characteristics of Products*. The International Institute for Industrial Environmental Economics. Lund, Lund University:
- Miljøstyringsrådet 1998 *Certifiserade Miljøvaredeklarasjoner – EPD. Almännna Principer og tilvægagångssätt*. Miljøstyringsrådet, Arbeishandling Versjon 3, 15. mai 1998
- Miljøstyringsrådet 1999 *Bestämmelser för Certifierade Miljövarudeklarasjoner, EPD. Svensk tillämpning av ISO TR 14025 Typ III Miljödeklarasjoner*. Miljøstyringsrådet MSR 1999:1
- Møller, H., Hanssen, O.J., Lindfors, L.G. , Svensson, T., Hoffmann, L., Stranddorf, H.K., Toldsted, J.T & Rønning, A. 1998. Nordic project on Implementation of Environmental Labelling Type III In the business sector (NIMBUS). Report from the pilot study on Nordic Environmental Product Declarations. *Østfold Research Foundation, OR.27.98*
- Naturvårdsverket (1999). *Producers ansvar för varors miljöpåverkan - underlag till en miljöanpassad produktolitik*. Stockholm.

10 Enclosure - NIMBUS format for Environmental Product Declarations Type III

The reports from the NIMBUS project are:

- I. Hanssen, O.J. et al. 2001. Nordic Co-ordinating System for Environmental Product Declarations Type III. STØ Report OR.20.01
- II. Hanssen, O.J. et al. 2001. Systems and Methodology for Type III Environmental Product Declaration. STØ Report OR.21.01
- III. Solèr, C. 2001. User requirement studies to Environmental Information. CPM Report 2001:4.
- IV. Vold, M. et al. 2001. Environmental Product Declarations in the Concrete Sewage Pipeline industry. STØ Report OR.22.01
- V. Hoffmann, L. et al. 2001. Environmental Product Declarations in the Energy Sector. Report from dK-TEKNIK ENERGY & ENVIRONMENT 2001
- VI. Stranddorf, H. et al. 2001. LCA methodology in EPD methodology. Report from dK-TEKNIK ENERGY & ENVIRONMENT 2001