

*A Management System for the Introduction of  
Product Stewardship*

**Manual**

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The *Vereniging van de Nederlandse Chemische Industrie* (VNCI – Association of the Dutch Chemical Industry) promotes the collective interests of the chemical industry in the Netherlands. The sector provides work for about 79,000 people and, within the Dutch industrial sector, is responsible for about 10% of the employment, 15% of the production, 20% of the export, 25% of the investment and 30% of research and development expenditure. The turnover of the chemical industry in the Netherlands is about NLG 70 billion.

The VNCI is situated in Leidschendam and has 34 staff who are mainly active in the policy fields of environment and safety, economic and legal affairs, education and communication.

On behalf of the chemical industry, they maintain constant contact with governments and politicians with respect to the regulations, agreements and commitments that concern the sector. Other important target groups for the VNCI are trade unions, education and employers' organisations.

Since 1992, the VNCI has propagated, both internally and externally, the Responsible CareR programme, which aims to permanently improve the chemical industry's performance in the field of safety, health and environment, as well as the communication in this respect.

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## Preface

Before you lies the manual entitled 'A Management System for the Introduction of Product Stewardship'. This manual is the result of an industry project called 'The development of a practical, widely usable and flexible system for product-based environmental care as part of Product Stewardship'.

In addition, the brochure 'Product Stewardship, A Force For Innovation' is available. These two documents serve as a content basis for encouraging the development and implementation of Product Stewardship in the chemical industry.

With these publications is the chemical industry among the first industries to offer its members a management system enabling large, medium-sized and smaller companies to flesh out in practice the product-oriented part of Responsible Care, referred to as Product Stewardship, in a practical manner. Specialisation according to the various target groups is new as well: the brochure intended for business managers stresses the business advantages of Product Stewardship and how it relates to the Responsible Care Programme. The manual in front of you is intended for the users. It deals with the way in which, for example, business, marketing, product, HSE or quality managers can shape Product Stewardship within their company.

For a number of years now, VNCI (*Association of the Dutch Chemical Industry*) has been active in the field of Responsible Care. In 1996 the 'Guide for the Introduction of Responsible Care' was published. This publication obviously also pays attention to Product Stewardship, the product-oriented part of Responsible Care. This manual goes more deeply into the system presented in the 'Guide' in 1996.

Since 1996, the Dutch Government has worked out its product policies in greater detail. In this the development and implementation of product-based environmental care has been one of the most important instruments. The zero-measurement made in 1996 – 1997 revealed that the chemical industry had advanced comparatively far in the field of product-oriented environmental policies. It also appeared from the study 'Putting product-based environmental care in the chemical industry into operation', which was completed early in 1997, that Product Stewardship and product-based environmental care show great similarity. Also the management system for Product Stewardship presented in this manual is similar to the basic elements of product-based environmental care.

This manual has been written in the framework of the Incentives Programme for Product-based environmental care launched by the Dutch Government. In 1997 a subsidy was granted to VNCI to organise a number of meetings intended to create a system for the introduction of product-based environmental care as part of Product Stewardship. This system was shaped from practice in co-operation with KPMG-Environment as a result of the projects carried out by four individual companies in the framework of that same Incentives Programme. These companies are: Avebe, Ciba Speciality Chemicals, PURAC Biochem and Solvay Chemie.

The project leaders of these companies were members of the monitoring committee of the project. In this committee were also representatives of the Ministries of Economic Affairs and of Housing, Spatial Planning and the Environment, the Working Group Product Stewardship of VNCI as well as staff of VNCI. Because of the many similarities between Product Stewardship and product-based environmental care and the fact that the term 'Product Stewardship' had already been introduced before in the framework of the Responsible Care Programme, the title 'A Management System for the Introduction of Product Stewardship' was chosen for the manual in consultation with the monitoring committee. The system pays attention to the health, safety and environmental aspects of the product.

This manual is the first of a series of publications and activities launched by VNCI to encourage the development and implementation of Product Stewardship as part of Responsible Care. In 1999 the management system has been presented officially to the members of VNCI. In addition a number of workshops have been and will be held.

The subjects to be discussed in the various publications will include interesting examples of the successful introduction of Product Stewardship in practice, specific instruments and methods used in chain analysis and communication and co-operation with customers and suppliers, performance indicators for Product Stewardship, developments within the Dutch and European Governments, VNO-NCW (*Employers' Federation*) and other industries.

Chapter 1 discusses Product Stewardship in brief. Chapter 2, the heart of the manual, describes the management system for Product Stewardship step by step. It offers a link to building environmental managementsystems to ISO 14001. To conclude the manual, Chapter 3 gives an outline of how Product Stewardship projects, which in many cases are initially carried out on a small scale, can be scaled up and anchored within the organisation.

*Leidschendam, June 1999 (updated March 2001)*

# 1. WHAT IS PRODUCT STEWARDSHIP?

Product Stewardship is:

*The responsible management of risks and improvement of the performance of a product in the fields of safety, health and the environment during its entire life cycle. This can be achieved through a continuous process of improvement on a healthy economic basis.*

It can be concluded from this definition that Product Stewardship is the product-oriented component of the Responsible Care Programme. In this respect Product Stewardship differs from primarily process-oriented internal corporate environmental management systems. Another distinguishing feature is the perspective of Product Stewardship, viz. the entire life cycle of the product chain, from the extraction and production of raw materials to semi-finished product, production and use of the finished product to the waste phase.

It is obvious that improvements in HSE performance should be made in a sound manner from the point of business economics. The presented system pays, therefore, explicit attention to the added value in terms of market and business economics and investments needed in manpower, know-how and technology. This cost-benefit analysis applies to on what scale and how Product Stewardship is introduced as well as to making decisions on identified options of improvement.

The vision of the corporate management is the basis for the development of Product Stewardship at the level of product groups or business units. It is the management's responsibility to formulate and propagate this vision. This is the point of departure for the business manager who will translate this vision into business unit strategy. It is an iterative process: the experience made in the business unit may induce adjustments being made in the vision held at the highest level in the corporation.

We know from experience that successful introduction of Product Stewardship can bring major advantages that will strengthen the competitive position of the corporation. These advantages are the following:

- Increased confidence in products and corporation through HSE risks control from the perspective of the entire life cycle;
- Strengthening of the market position through improved HSE performance of the products;
- Creation of win-win situations for your corporation, your customers and your suppliers through further chain integration;
- Possibilities for fundamental product innovation and opening up of new markets as a result of opting for the way in which the product performs its function as the perspective for product development.
- As a result of its strategic nature, Product Stewardship can contribute to achieving the overall HSE performance desired by the corporation.

The added value of Product Stewardship is discussed in greater detail in the VNCI publication entitled: 'Product Stewardship, a Force For Innovation'. This manual describes how a corporation can start the development and implementation of Product Stewardship.

## 2. A MANAGEMENT SYSTEM FOR PRODUCT STEWARDSHIP

This chapter describes a system for the development and introduction of Product Stewardship in your organisation. The presented system has been shaped in practice and is based on three components:

- Pilot projects carried out at widely different chemical companies in the framework of the Incentives Programme for Product-based environmental care;
- Contributions made by the participants of the workshop held on 'Transfer of knowledge of Product Stewardship in the chemical industry', the VNCI working group 'Product Stewardship' and the monitoring committee of the chemical industry project called 'The development of a management system for Product Stewardship'.
- The so-called growth model for the introduction of ISO 14001: Here the point of departure is a thematic approach which in time results in standardisation and formalisation of the environmental management system.

It appeared in practice that Product Stewardship can be developed and introduced successfully and effectively by using existing structures and management systems. A connection to the ISO 14001 series is, therefore, obvious.<sup>1 2</sup>

Environmental management systems to ISO 14001 already pay some attention to products and relations with suppliers and customers, which is one of the core elements of Product Stewardship. A second analogy is the emphasis being put on improving the HSE performance of products. As a result of the cyclic nature of the suggested approach and chain analysis, as well as communication and co-operation with customers and suppliers, one gets an increasingly better insight into the possibilities to improve the HSE performance of products.

This chapter discusses the various components of the management system for Product Stewardship. To begin with, it outlines the concrete steps that can be taken for each component of the system. Next, the connection with the environmental management systems to ISO 14001 is indicated. It successively discusses the following aspects:

1. Management commitment: Formulation of a vision on Product Stewardship;
2. Planning: Set-up of one or several pilot projects;
3. Realization and implementation: Realization of Product Stewardship projects
4. Monitoring and corrective measures: Improvement on how Product Stewardship projects are being carried out.
5. Management review: the added value of Product Stewardship and subsequent introduction.

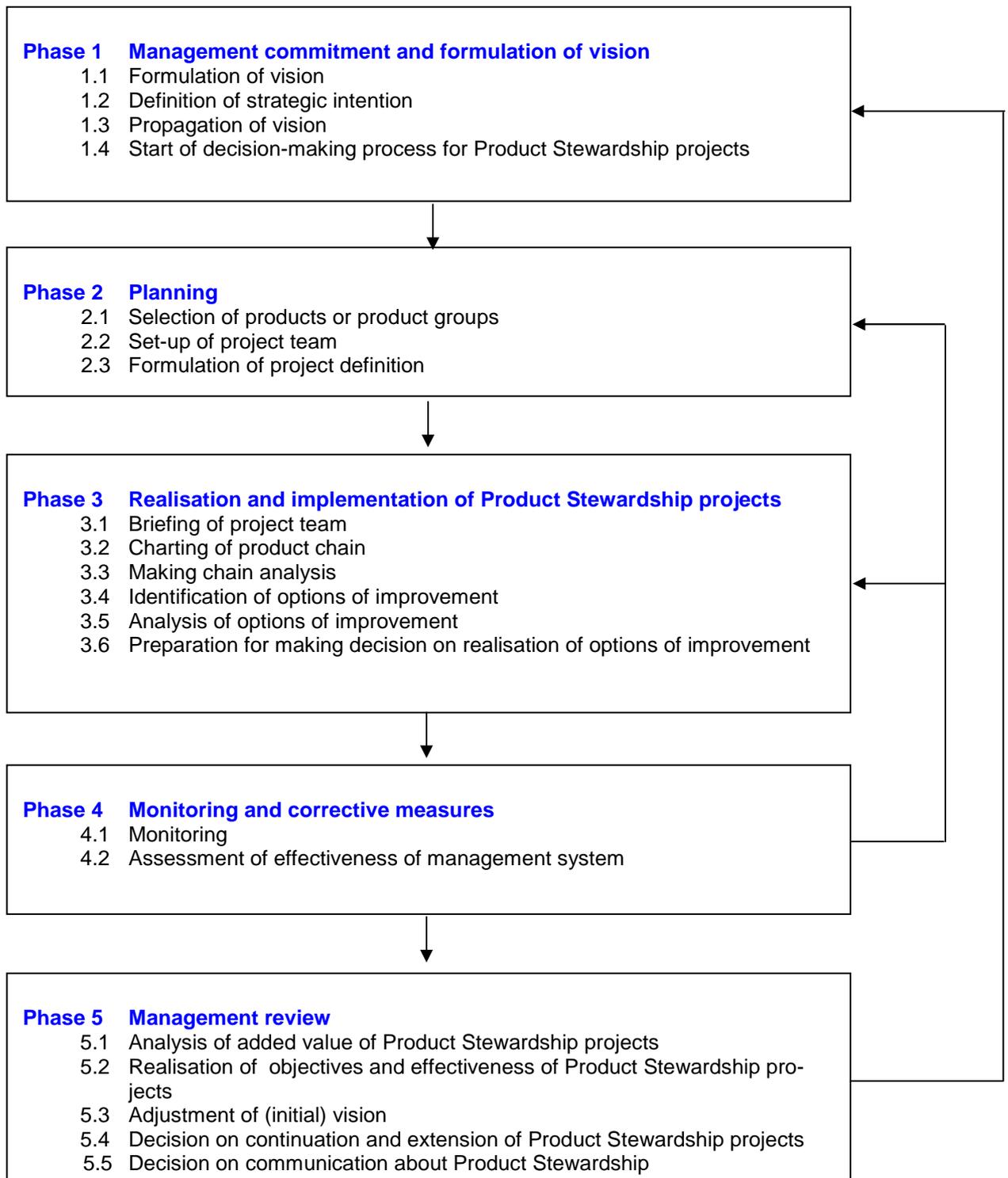
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<sup>1</sup> This is the line which is also followed by VNO-NCW (Dutch Employers' Association) and the Ministry of Housing, Spatial Planning and the Environment. See also Appendix B for relevant publications in this field.

<sup>2</sup> We wish to emphasize that an environmental management system to ISO 14001 is not a necessary precondition for the development and introduction of Product Stewardship.

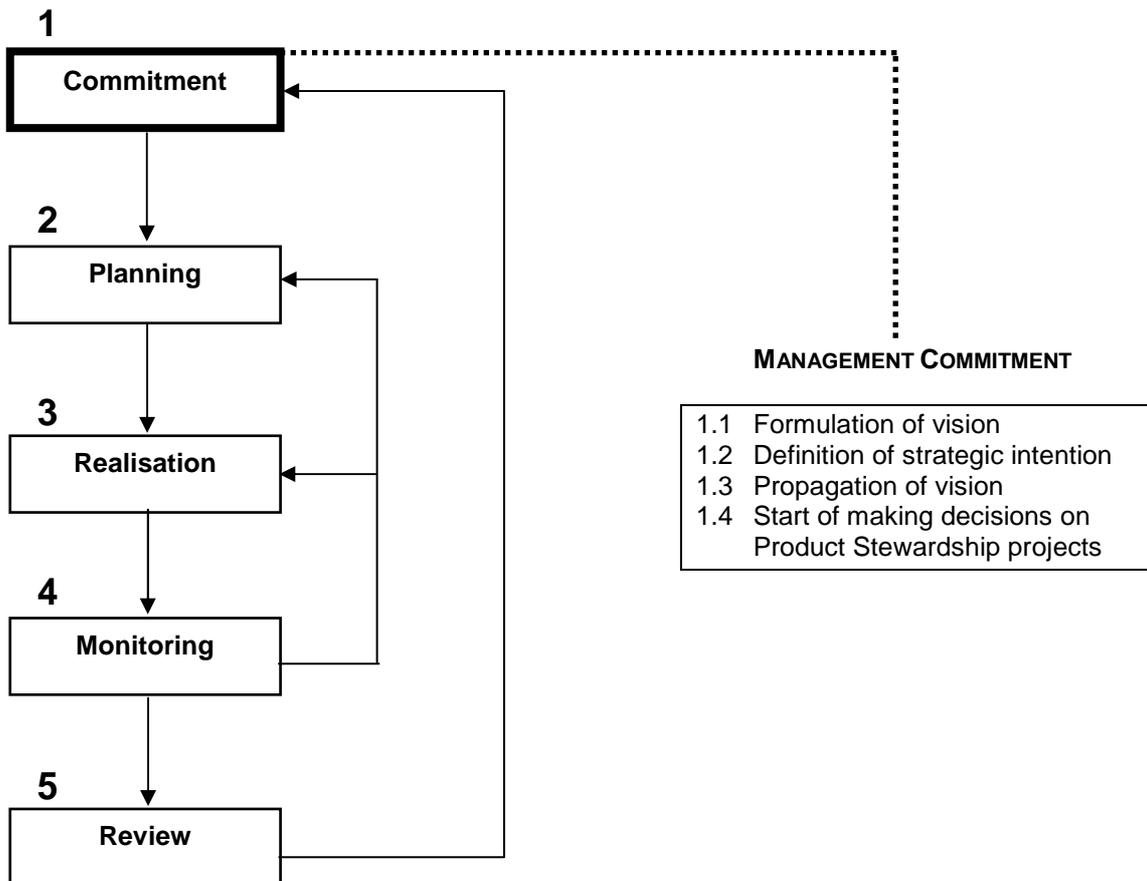
Fig. 1 summarises the above components of the management system. They are explained in detail in Sections 2.1 to 2.5.

**Fig. 1: Management system structure for Product Stewardship**



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## 2.1. Management Commitment and Formulation of a Vision



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### Formulation of a vision

Effective, i.e. clear commitment of the management of the corporation is a precondition for the successful development and introduction of Product Stewardship. This requires the management of the corporation to formulate and propagate a vision on Product Stewardship, both inside and outside the corporation.

In this Product Stewardship is not a concept in itself. To begin with, it is part of the Responsible Care Programme, to which most VNCI members have committed themselves. Secondly, Product Stewardship is of a strategic nature, so that it cannot be detached from the vision, mission and strategy of the corporation. Both aspects are explained in greater detail in the brochure for business managers. Table 1 lists a number of areas for special attention for the management of the corporation. Answering the questions asked can provide material for the formulation of a vision on Product Stewardship.

When a corporation starts the development of Product Stewardship, an initial vision can be formulated. It can be adjusted and accentuated annually on the basis of the results of the management review (See 3.5).

**Table 1** Areas for special attention with regard to developing a vision on Product Stewardship

- What is the corporate policy regarding Responsible Care in general and Product Stewardship in particular?
- How relates the Product Stewardship policy, i.e. regarding continuous improvement of the HSE performance of the products, to the vision, mission and strategy of the corporation?
- How does any added value of Product Stewardship relate to the present and future product-market combinations? This aspect is discussed in greater detail in the brochure for business managers.
- What is the desired positioning in the field of Health, Safety and Environment in relation to the image of the corporation? And in relation to the culture of the organisation and the core values of the employees?
- What are the developments at the major customers and end-users? Both individual corporations and organisations in the industry may be considered.
- What are the developments in products policy, legislation and regulations of national and international authorities?
- What items are on the agendas of parties concerned other than those stated above, such as conservationists, and what is their influence on the market position and image of the corporation?

**Definition of the strategic intention:  
The highest desirable and feasible ambition**

On the basis of the vision on Product Stewardship, the strategic intention can also be made explicit: What is the highest feasible ambition in Product Stewardship? What is the present position of the corporation and what position does the management want to reach for a medium long period? The answer to this question will determine the width (the number of business units and product groups) and the pace at which Product Stewardship is introduced. If it is unclear or unknown what is the position of the corporation as far as Product Stewardship is concerned, a zero-measurement can be made. When a zero-measurement for Product Stewardship is taken, attention may be paid, analogously to the zero-measurement run to ISO 14001 for environmental management systems, to the above main components of the management system:

- Management commitment
- Planning
- Realization and implementation
- Monitoring and corrective measures
- Management review

Appendix A contains a checklist which can be used as a basis for ascertaining the as-is situation with regard to Product Stewardship<sup>3</sup>.

**Propagating the vision on Product Stewardship**

Propagating the vision and ambition with regard to Product Stewardship in smaller companies is comparatively simple. In many cases the number of product groups is limited, the powers to make decisions lie with a relatively small number of players. As a result, the lines of communication are short and the vision and policies in the field of Product Stewardship can be propagated directly and effectively.

Propagating the management's vision in large companies which operate on an international scale is a more complex matter, deserving extra attention. Each division or business unit has its own strategy, specific core activities and, in many cases, its own culture. Besides the number of business managers who have to shape Product Stewardship in practice is considerably larger. Considering the various specific advantages of Product Stewardship and the way in which the management system is shaped in practice, we recommend to request the Management of the division or business unit to translate the vision at the level of the industrial conglomerate down to the level of the division or business unit.

The pace at which Product Stewardship is introduced determines which sections are to be involved in the process and when. (See also sub 3.5: 'Management Review' and 4: 'Scaling Up of

<sup>3</sup> This checklist will also be used in the annual evaluation by VNCI for the Product Stewardship section of the Responsible Care Programme.

Product Stewardship'). Unless the corporation wants to introduce Product Stewardship at an accelerated pace, it is not necessary that all business managers should translate simultaneously the corporate vision to the divisional or business unit level.

### Decision on starting up Product Stewardship projects

Once the (Initial) vision has been formulated and propagated within the corporation, the Management should decide on starting one or several Product Stewardship projects. Most corporations opt for carrying out a limited number of pilot projects first. Other sections can turn the knowledge and experience thus acquired to profit and translate and introduce the management system developed.

One or several business units or product groups are selected. In addition, the business managers concerned are requested to take such action as necessary to start up the projects and to coordinate the process of carrying them out. It is obvious that the Management should also make the necessary means available.

It is of paramount importance that the Management should make time available to monitor at least the outlines of the projects and support them in an active manner if necessary. Once the Product Stewardship projects have been completed, or even better, on completion of the first corrective cycle, the results are reported as part of the annual management review. At this point the decisions on progress and extension of the Product Stewardship projects are also made. (See also sub 2.5: 'Management Review').

**Table 2: Connection with ISO 14001**

<b>Phase 1 Management commitment and formulation of a vision</b>		
	<b>Steps (according to manual)</b>	<b>Sections of ISO 14001</b>
	1.1 Formulation of vision	4.2 + 4.4.2 + 4.4.3
	1.2 Definition of strategic intention	ditto
	1.3 Propagation of vision	ditto
	1.4 Decision on start-up of Product Stewardship projects	ditto

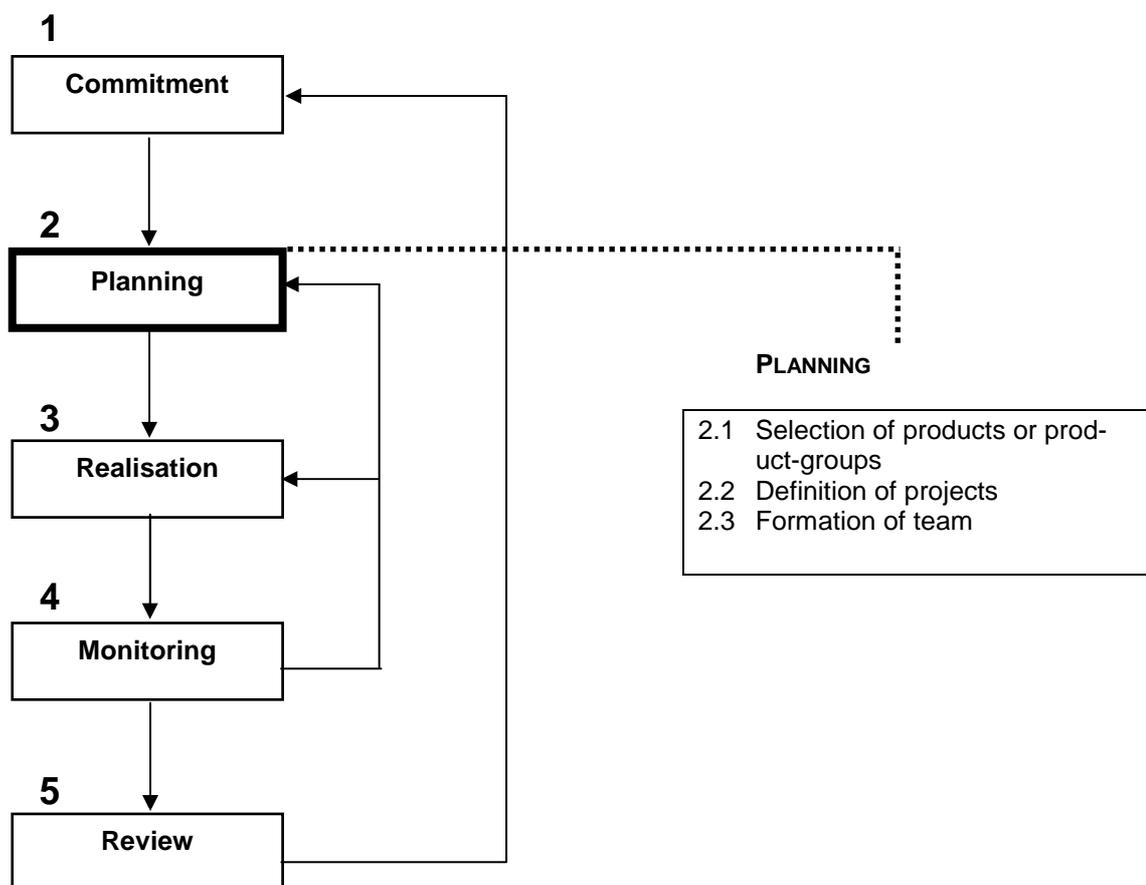
### Explanatory notes

The highest management level must define the environmental policy of the organisation and ensure that:

- it is suitable for the nature, size and environmental effects of their activities, products or services;
- it contains a commitment to continuous improvement and prevention from pollution of the environment;
- it contains a commitment to adhere to environmental legislation and regulations as well as other requirements endorsed by the organisation (e.g. covenants and long-range agreements, the ICC business charter and the responsible care programme);
- it offers a framework for defining and assessment of environmental objectives and tasks;
- it is laid down (in writing), implemented and made known to all employees;
- it is available to the general public.

The section called 'Management commitment and the formulation and propagation of a vision' bears great similarity to Section 4.2 of the ISO 14001 series. In view of the strategic nature of Product Stewardship and the great importance of the relationship between the vision on Product Stewardship and the mission and strategy of the corporation, it is necessary to pay extra attention to this step. There is also a connection with the Sections 4.4.2: 'Training, awareness and professional competence' and 4.4.3: 'Communication': Propagation of the vision will result in increased awareness of the corporation staff.

## 2.2. Planning



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### Selection of products

The policy formulated by the Management of the corporation can now be translated to concrete Product Stewardship projects. The business manager appoints a project leader to whom he can delegate a great part of his responsibilities. The first step is to select one or several products with which Product Stewardship will be started up. Table 3 lists a number of areas for special attention which may be helpful when selecting products or product groups.

**Table 3** *Selecting a product and product groups*

- To which products do the questions asked by customers about health, safety and environment refer?
- In which product chains does a substantial improvement in the field of health, safety and environment possible beforehand? Can the corporation distinguish itself in this field from the competition?
- In which product chains does the corporation maintain a good relationship with suppliers and customers to the extent that exchange of information and co-operation in the field of product stewardship will work out smoothly?
- In which product chains can the corporation exercise substantial influence towards suppliers (and customers)?

### Drawing up a project definition

Next, the project leader writes a project definition and draws up a project plan in close consultation with the business manager. In this plan the objectives, means needed, duration and reporting aspects, review and decision-making on progress are laid down. On this basis a pilot project can be carried out.

### Formation of a project team

In addition, the business manager and the project leader form the project team in which the various disciplines are represented which are relevant to the chain analysis, identification of options of improvement and communication and co-operation with partners in the chain. A possible composition of the project team is explained in Table 4.

**Table 4** *Composition of project team*

<p><b>Marketing and sales</b></p> <ul style="list-style-type: none"> <li>▪ Estimate of potential market</li> <li>▪ Contacts with customers</li> </ul> <p><b>R &amp; D</b></p> <ul style="list-style-type: none"> <li>▪ Ideas for improvement</li> <li>▪ Estimate of the realisation of the options of improvement</li> </ul> <p><b>Purchasing</b></p> <ul style="list-style-type: none"> <li>▪ Options of improvement as far as suppliers are concerned</li> <li>▪ Facilitation in contracts with suppliers</li> </ul> <p><b>Health, safety and environment</b></p> <ul style="list-style-type: none"> <li>▪ Knowledge of current HSE initiatives, legislation and regulations</li> </ul> <p><b>Production and logistics</b></p> <ul style="list-style-type: none"> <li>▪ Knowledge of one's own production process and technical options of improvement</li> <li>▪ Knowledge of flows of raw materials and products and options of transportation.</li> </ul>
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**Table 2** *Connection with ISO 14001*

<b>Phase 2 Planning</b>	
	<b>Sections of ISO 14001</b>
<b>Steps (according to manual)</b>	
2.1 Selection of products	4.3 + 4.4.1 + 4.4.2 + 4.4.6
2.2 Writing of project definition	ditto
2.3 Formation of project team	ditto

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#### **Explanatory notes to the connection between PS and ISO 14001 Sections**

##### **4.3.1 Identification of environmental aspects and effects**

This occurs in the suggested system when the chain analysis in phase 3 is made: 'Realisation and implementation'.

##### **4.3.2 Statutory and other requirements**

This aspect is being dealt with when the vision is formulated (See also list of areas for special attention) and the chain analysis is made (See also sub 2.3.3).

##### **4.3.3 Objectives and tasks**

This aspect is discussed in phase 2 under 'Planning'.

##### **4.3.4 Conservation programmes**

Ditto.

##### **4.4.1 Structure and responsibility**

The suggested approach initially knows a project organisation which in time is systemised and structured. The various responsibilities of the Management, business managers and project leader have been discussed above. For the specific responsibilities of the business manager see also the VNCI publication entitled: 'Product Stewardship, a Force For Innovation'.

##### **4.4.2 Training, awareness and professional ability**

The necessary knowledge and expertise is transferred to the project team during the briefing (See also sub. 2.3.1).

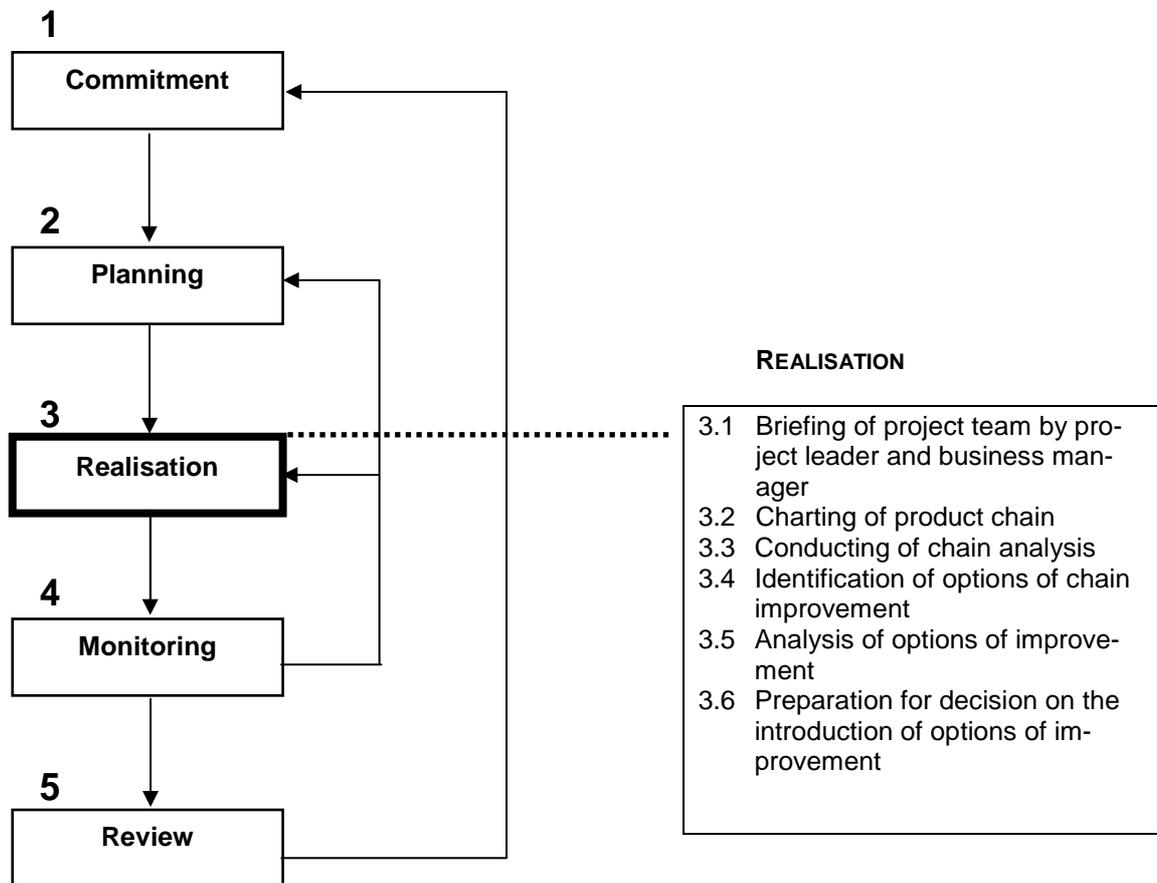
##### **4.4.6 Operations Control**

The responsibility for carrying out the Product Stewardship projects lies with the business manager and project leader.

#### **Explanatory notes to selection for division of chain analysis**

The chain analysis, which includes co-operation with customers and suppliers, is one of the most important components of Product Stewardship. Individual pilot projects have shown that the chain analysis made at the beginning is an integral part of carrying out Product Stewardship projects. For this reason we have opted for ranging the chain analysis in phase 3: 'Realisation and Implementation'. At the point when the HSE profiles of the major products of a business unit have been charted, focus will shift to the use of the results of the chain analysis and identification, analysis and implementation of improvements. If desired, the chain analysis can then be ranged in phase 2: 'Planning'. At this point the division differs from the one to ISO 14001. It is obvious that you are free to adhere strictly to this structure, ranging the chain analysis in phase 2: 'Planning'.

### 2.3. Realisation and implementation



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At the planning stage, the vision on Product Stewardship at corporate level has been translated down to product group level or business unit level. Next, one or several products have been selected by the business manager and the project leader. Besides, the project definition has been formulated and the team has been formed.

Now the Product Stewardship project can be started up. The subsequent process passes through the following stages in practice:

1. Briefing of the project team by the business manager and the project leader;
2. Charting of the product chain;
3. Conducting the chain analysis;
4. Identification of options for improvement;
5. Analysis of options for improvement;
6. Preparation for decision on implementation of options for improvement

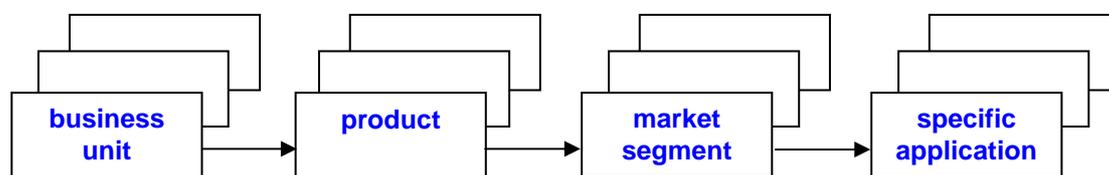
### Briefing of Project Team

For most members of the project team, product stewardship is a new concept. The first step is to convene a meeting with the team. In co-operation with the project leader, the business manager presents the vision on Product Stewardship and explains the selection of products made, objectives and project schedule.

### Charting of Product Chain

In many cases, products find a wide variety of applications in different segments of the chemical industry. We strongly recommend to choose two applications of the selected product for the first Product Stewardship project (See also Fig. 2). It is virtually impossible and, moreover, inefficient to involve in the chain analysis in one go the greater part of the functions performed by the product. This would mean, for instance, that a wide range of data would have to be obtained from most customers and suppliers. This would require too great an effort from your own organisation at the beginning, the concrete result of which would probably be insignificant.

**Figure 2** *Choosing a specific application*

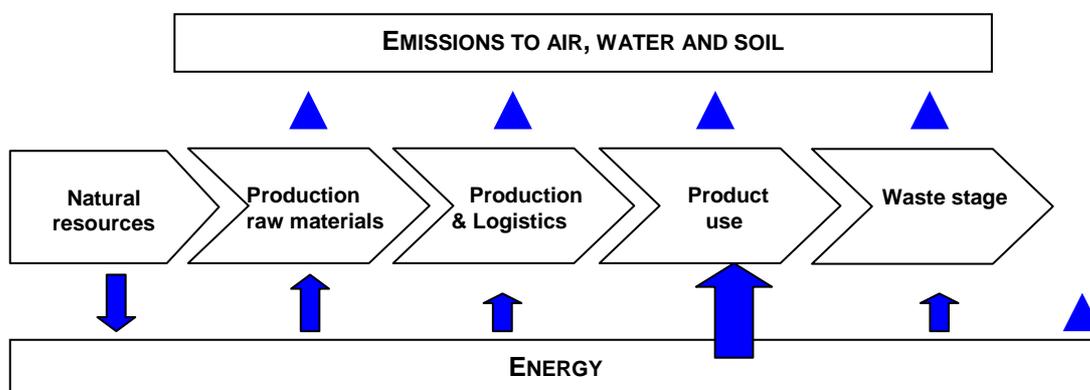


When choosing the application, you may consider the volume of the market segment (who are the biggest customers? Another selection criterion is the relationship with the customers. If you have a good relationship with a given customer, this can make the exchange of information a lot easier. Finally, it may also be considered whether there are applications of which you know beforehand that substantial improvements in the HSE field can be achieved.

The criteria for choosing a specific application are comparable to those being used for selecting the product to be tested. Once the application has been chosen, the product chain can be charted.

For this all important chains, ranging from raw material to intermediate products to the using and disposal stages, must be included (see also Fig. 3).

**Figure 3** *Example of product chain (source: Environment Report 95 from Unilever)*



In respect of this step, and in addition to charting the product chain itself, two matters are of great importance, viz.:

1. The description of the function performed by the product;
2. Product chain demarcation.

**Sub 1: Function of the product**

Explicit attention must be paid to the link in the chain where the product performs its function. In the chemical industry this is in nearly all cases not the direct purchaser, but the first or second link that follows next. This corporation determines a significant part of your market as well as the quality specifications, including HSE performance.

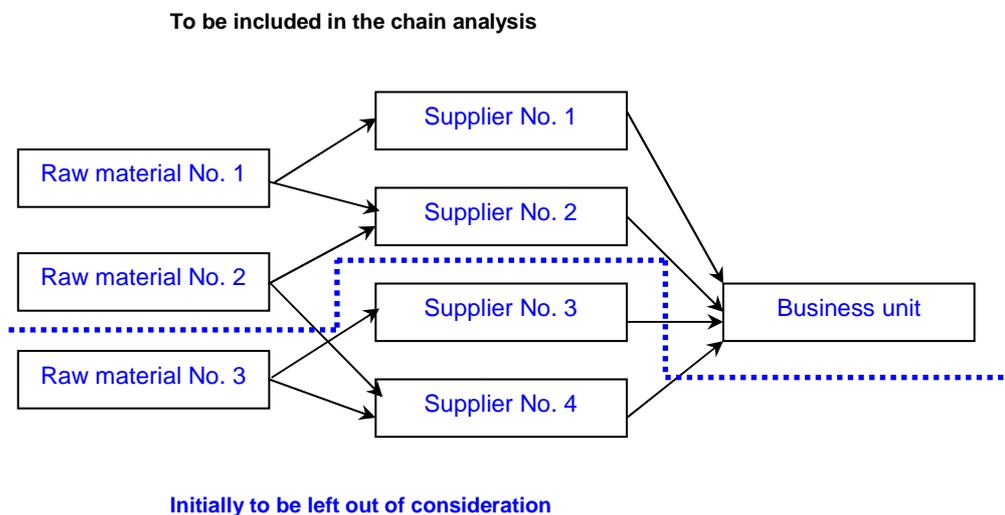
Knowledge of this link in the chain will enable you to understand your customer better. As a result, you can anticipate to expectations, needs, opportunities and threats in the chain. The choice of using the function of the product as a starting point also enables you to compare in the future your HSE performance with that of your competitors (See also the VNCI publication entitled: 'Product Stewardship, a Force For Innovation').

**Sub 2: Demarcation**

The project leader should determine the product chain in co-operation with the experts in the project team concerned and reach an initial demarcation, or, in other words, determine the limits of the system (See also Fig. 4). On the buyer's side this was actually done already when the specific application of the product was selected. Also in this case it must be ascertained yet where the product chain is demarcated 'downstream'. If the product is to be recycled, it is virtually impossible to keep track.

On the suppliers' side the system limits of the analysis must be determined as well. Here too, you have to look at the suppliers of your direct suppliers, unless your corporation operates in the very front of the product chain. In this case you get your raw materials almost directly from nature. We recommend you to first look at the sizeable material flows, combined with those raw materials which are known to pollute the environment heavily in the process of extraction or production.

**Figure 4 Demarcation of the product chain**



### **Making the chain analysis**

The specific application of the product, the product chain and its demarcation have now been defined. The next step is to conduct the chain analysis. We recommend to first chart the outlines of the consequences in the HSE field by carrying out a quick scan called 'lifecycle analysis' (LCA). In this emphasis is put on the largest material flows, the links in the chain with a high energy and water consumption and relatively high emissions to water, air and soil or large waste flows.

This will prevent the chain analysis from becoming too complex at the start, requiring relatively much time, and, consequently, money. The chain analysis is the basis for identification of the options of improvement and is, therefore, one of the most important components of Product Stewardship. Especially large corporations have acquired knowledge and experience over the last few years in conducting LCAs. It appeared in practice that medium size and smaller corporations in many cases did not know how to conduct a LCA, its possibilities and limitations. Appendix B states some relevant publications and addresses of organisations which have gained experience with conducting LCAs, market software or offer services or training courses in this field.

### **Integration of HSE aspects**

The LCA puts emphasis on the environmental aspects of the product chain, paying at the same time attention to the humane and eco-toxicity. However, in most cases safety risks and working conditions are not included.

As Product Stewardship also refers to the above aspects, they should be integrated in the chain analysis. Most corporations already pay attention to safety and health aspects. Major risks and recommendations for handling, transport, use and disposal of products are summarised in the Safety Data Sheets. By obtaining this information from customers and suppliers, the safety and health aspects can be added. On the basis of a risks assessment, which is often summarised as a risks characterisation ratio, the importance of the risks concerned can be determined.

When the above analysis has been completed, you have obtained a distinct image of the HSE profile for the selected application of the product. On this basis, options of improvement can be identified from the perspective of the entire product chain.

### **Qualitative aspects**

In the chain analysis, emphasis is put on the technical aspects and quantifiable results. We recommend to also pay attention to qualitative aspects. For this you may look at the Government's policy, legislation and regulations, developments at customers and end-users, as well as the agenda of social organisations such as environmentalists. The expectations of third parties offer a different perspective from which to look at the HSE profile, providing points of application for identification of options of improvement.

### **Communication and co-operation with customers and suppliers**

Communication and co-operation with customers and suppliers is one of the core elements of Product Stewardship. To conduct the chain analysis, you need, in addition to your own data, the information from other links in the product chain. In this the representatives of the marketing and purchasing departments play a major part. As they are directly involved in the project (See also 'Planning, composition of the project team'), they are familiar with Product Stewardship.

In co-operation with the project leader a questionnaire is drawn up to structure the information to be gathered. Next, the customers and suppliers may be contacted to gather the information needed. As mentioned above, it should be relatively easy to obtain the information on safety and health risks. By now, most corporations have Safety Data Sheets on their products available.

The information on energy and water consumption, raw materials being used and their production can be borrowed from the conservation systems of the partners in the chain. However, in many cases this information refers to the production site and has not been attributed (yet) to the products themselves. In this case an estimate has to be made, in co-operation with the customers or suppliers, of the degree of environmental impact to be attributed to the products. This problem does not exist where partners in the chain have already made a life cycle analysis themselves. Where this is not the case, attribution of the degree of environmental impact will require a greater effort.

When the pilot projects were run at individual corporations in the chemical industry, it appeared that most partners in the chain were prepared to co-operate in the chain analysis. In some cases resistance was met or there were practical impediments. They were not prepared to release (confidential) information or indicated that the information asked was not available (yet). This problem is being faced especially in international product chains: It appeared difficult and sometimes impossible to obtain the information from suppliers in Asia or Latin America. As a consequence, not all chain analyses made during the first cycle of improvement could be finished off completely.

It is up to the project leader and the business manager to find out whether, and if so, how the necessary information can still be obtained. One option is to request the marketing and purchasing departments, after having consulted the Management, if necessary, to use their influence and contacts to obtain the necessary information as yet. Obviously this depends to a large extent on the 'business climate' and the position of power held in the chain. It is easier for large customers to bring pressure to bear on their suppliers. A second option is to include the environmental aspects in the quality audits. A third option is to estimate yourself the degree of environmental impact by consulting, for example, existing databases.

**Possible approach if problems arise when (environmental) information is to be obtained from customers and suppliers.**

- Use influence and contacts of the marketing and purchasing departments or of the senior Management;
- Integrate environmental aspects into quality audits;
- Consult Safety Data Sheets; on this basis existing databases containing environmental information can be used to make estimates.

Lack of relevant information can be a very impeding factor in the development of Product Stewardship. Corporations which take Product Stewardship seriously may in extreme cases consider the option of finding alternative suppliers of raw materials.

Once the necessary experience has been acquired in communication and co-operation with suppliers and customers, specific procedures and, if necessary, audits may be developed for this.

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**Identification of options of improvement**

One of the most effective methods to identify options of improvement, is to organise one or two workshops with the project team referred to above. The results of the quick scan LCA can be presented and interpreted. In the second part of the workshop the possibilities for better management and to improve the environmental profile of the product can be charted. In this operation the participants can generate ideas from the perspective of the suppliers, own activities and customers. The following section shows an example of the agenda of such a workshop.

**Example of the agenda of a workshop held to identify options of improvement**

- Presentation of the results of the quick scan LCA
- Identification of options of improvement
  - Own processes
  - Customers
  - Suppliers
- First estimate of desirability and feasibility of options of improvement
  - Environmental gains
  - Economic feasibility
  - Organisational feasibility
  - Consequences for product performance
- Next steps
  - Filling in of lacking data in chain analysis
  - Options for improvement still to be studied

Once the chain analysis is solid enough, you may consider to organise a workshop with suppliers and customers. As well as the other advantages that may result from intensifying the contacts with the partners in the chain, even more ideas for improvement can be identified during the workshop.

### Analysis of options of improvement

The options of improvement have been identified in the course of the workshop. The next step is to investigate which ideas should be considered for realisation. When selecting the most interesting options of improvement, you may look at the following aspects:

- Gains expected to be achieved in the HSE field;
- Technical feasibility;
- Consequences for product performance and expected market value of the improvement;
- Feasibility in terms of business economics (time needed to recover the costs)
- Feasibility in terms of organisation: Can the improvement be realised in co-operation with the present partners in the chain, or possibly with others? The options of improvement are described in the improvement plan.

### Preparations for making a decision

The most interesting and practical options of improvement can be summarised and submitted to the Management to be decided upon. For the introduction of those improvements which fall within the competence of the business manager, a Plan of Approach can be drawn up.

More drastic improvements which cover a longer period of time, for example, or require substantial capital outlays, may be submitted to the senior Management. Depending on how urgent they are, one may opt for including these proposals in the annual management review. In this, the decision to be made on realising of options of improvement is one of the areas for special attention (See also sub. 2.5).

**Table 6 Connection with ISO 14001**

<b>Phase 3 Realisation and implementation</b>		
	<b>Steps (according to manual)</b>	<b>Sections of ISO 14001</b>
	3.1 Briefing of project team	4.4.2
	3.2 Charting of product chain	4.3.1; 4.3.2
	3.3 Conducting chain analysis	ditto + 4.4.3
	3.4 Identification of options of improvement	ditto + 4.4.3
	3.5 Analysis of the options of improvement	ditto + 4.3.3 + 4.3.4
	3.6 Preparations for decision	ditto

**Explanatory notes to the connection between PS and ISO 14001 sections**

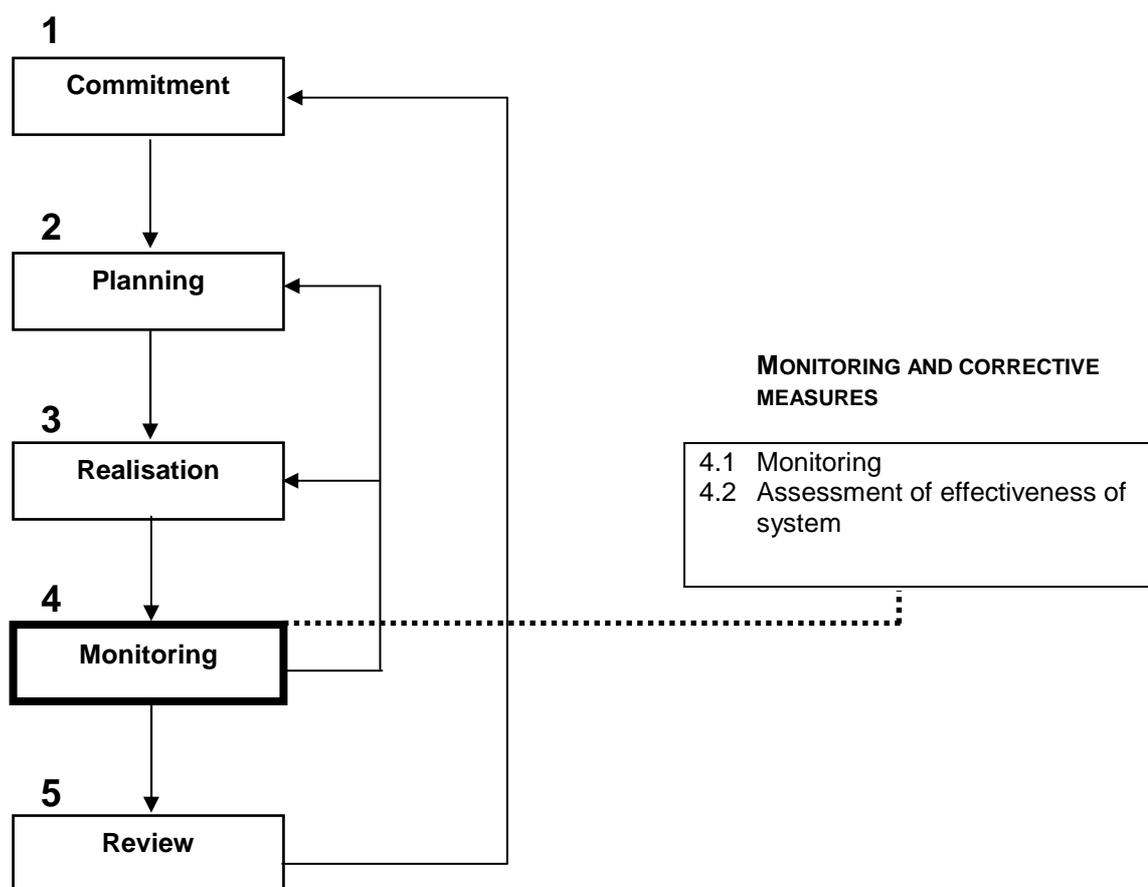
**4.3.1 and 4.3.2: Environmental aspects and statutory and other requirements**  
 Identification of the most important environmental aspects and effects as well as identification, analysis and selection of options of improvement from the chain perspective are an integral part of the Product Stewardship projects.

**4.3.3 and 4.3.4: Objectives and tasks and the Conservation programme**  
 The options of improvement are laid down in a plan for improvement. It contains objectives and a programme for their realisation.

**4.4.2: Training, awareness and professional skill**  
 This is dealt with when the project team is briefed by the project leader and business manager.

**4.4.3: Communication**  
 When the Product Stewardship projects are being carried out, you exchange information with and co-operate with customers and suppliers. In this the existing functions, such as purchasing and marketing, play a central part. This the reason why these functions are also represented in the project teams. Practice has shown that dealing with HSE aspects in a convincing and effective manner is relatively unknown to purchasing and marketing departments. By involving these functions in the project right from the start, they gradually become proficient at taking HSE aspects into consideration in their contacts with customers and suppliers (See also sub 2.2.3: 'Composition of project team' and sub. 2.3.1: 'Briefing of project team').

## 2.4. Monitoring and corrective measures



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### 2.4.1 MONITORING

The business manager and project leader are responsible for monitoring the progress of the Product Stewardship projects. They see to it that the objectives and planned schedule are achieved. If necessary, the plan be adjusted or progress can be accelerated.

Monitoring of improvements in Product Stewardship is of a different nature than monitoring of the HSE performance at the production site. The fact is that performance elsewhere in the chain plays a part as well. The HSE performance from the chain perspective is measured by means of the quick scan life cycle analysis (ICA, see also sub. 2.3). Realisation of the selected options of improvement is expressed in the results of the ICA (the HSE profile of the product).

At present, the CEFIC (Federation of European Chemical Industries) is developing performance indices for Product Stewardship. As soon as directives for this have been developed you will be informed.

### 2.4.2 EFFECTIVENESS OF THE MANAGEMENT SYSTEM

As far as the effectiveness of the management system for Product Stewardship is concerned, you may consider, as the number of projects increase, holding Product Stewardship audits. The audit protocol can be based on, among other data, the checklist for zero-measurement (See Appendix A). It is obvious that it should be translated towards the specific situation in your corporation. The results of the audits can be included in the management review. On this basis modifications can be made, if necessary, to increase the effectiveness of the management system. As is also indicated in Chapter 3, we recommend not to start the process of formalising the system until the need for steering, co-ordination and standardisation is increasing. This point differs for every corporation and depends greatly on the pace at which Product Stewardship is introduced.

**Table 7** *Connection with ISO 14001*

<b>Phase 4 Monitoring and corrective measures</b>		
	<b>Steps (according to manual)</b>	<b>ISO 14001</b>
4.1	Briefing of project team	4.51 to 4.5.4
4.2	Charting of product chain	ditto

#### **Explanatory notes to connection between PS and ISO 14001 sections**

**4.5.1: Monitoring and measurements**

Discussed in phase 4

**4.5.2: Deviations and corrective and preventive measures**

ditto.

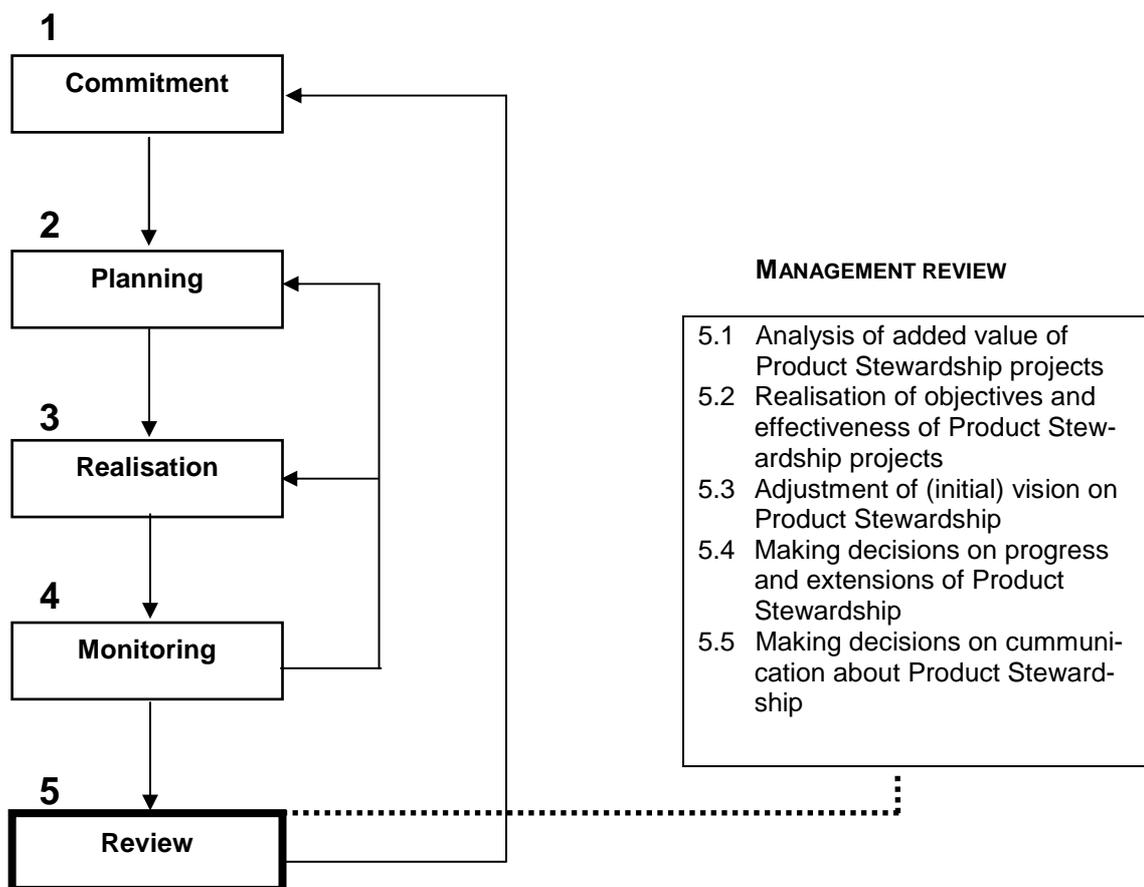
**4.5.3: Registrations**

ditto.

**4.5.4: Conservation system audits**

ditto.

## 2.5. Management Review



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Each Product Stewardship project is to be evaluated, preferably annually, by the business manager and project leader concerned. This evaluation is to be discussed with the project team and to be put on record in a report, which is to be submitted, along with a proposal on the continuation or extension of Product Stewardship projects, to the Management of the business unit or the corporation. In the case of larger corporations the Management of the business unit may also present a summary of the report(s) to the Senior Management. The above areas for special attention are explained below.

### Analysis of added value of Product Stewardship projects

When the added value resulted from the Product Stewardship projects is determined, it is examined to what extent the advantages stated in Chapter 1 have been realised:

- Is it possible to control better or reduce the HSE risks? Do the Product Stewardship projects offer the possibility to answer questions asked by customers in an efficient and consistent manner? Can this help increase the confidence in the product?
- Can the market position be strengthened by realising the most interesting options of improvement?
- Can you expect to create win-win situations by strengthening co-operation with partners in the chain?
- Have any ideas for product innovation resulted or have any markets been identified for new applications?
- Do the selected options of improvement contribute to improvement of the HSE performance at corporation level?

In addition an estimate can be made of the opportunities that can be exploited in the future. The advantages that have been realised and the expectations for the future can serve as the basis for making decisions on continuation and extension of the Product Stewardship projects.

### Realisation of objectives and effectiveness of Product Stewardship projects

The effectiveness of the selected approach can be determined by passing through the various steps of carrying out of Product Stewardship and by checking to what extent they appeared practicable. These steps, which were explained sub 2.3, are the following:

- Briefing of the project team by the business manager and project leader: transfer of knowledge and instruction on (the realisation of) Product Stewardship;
- Charting of the product chain(s);
- Running chain analysis(es);
- Identification of options of improvement;
- Analysis of options of improvement;
- Preparation for taking a decision on carrying out the options of improvement.

### Adjustment of the (initial) vision on Product Stewardship

In addition, the initial vision at product group level can be accentuated by the business unit on the basis of the knowledge and experience acquired. This also applies to the vision at corporate level. It can also be decided at this point whether the growing number of projects has led to an increasing need for steering and co-ordination to the extent that the thematic approach should be changed to the development of a management system.

### Decision on continuation and extension of Product Stewardship

Once the added value of and practical feasibility of Product Stewardship projects has been visualised, a proposal to the Management can be drawn up, indicating whether and in what way Product Stewardship is to be developed and introduced further. The various options are summarised in Table 8 overleaf.

**Table 8** *Preparation for decision on continuation and extension*

Options	Points for special attention
<p><b>Option No. 1</b> The projects are discontinued because the added value is too limited and the possibilities for improvement can be included in the process-oriented HSE system.</p>	<p>Is this conclusion true of all product groups and sectors of the corporation? Can the knowledge and experience acquired be utilised in a useful way elsewhere in the organisation? Can some of the options of improvement that have been identified be included in the internal conservation operations of the corporation and be realised as yet, if desirable?</p>
<p><b>Option No. 2</b> The project in progress will be continued, with, for example, the following improvements being implemented:</p>	<p>The chain analysis is improved (data validation, entering of missing data). Contacts with the partners in the chain are intensified. Additional information is obtained. Identification of additional possibilities of improvement. The analysis of the identified options of improvement are made more profound in preparation of the decision on its implementation.</p>
<p><b>Option No. 3</b> The improvement plan with one or more improvement options will be implemented:</p>	<p>This will lead to a new cycle aiming at implementing one or more selected improvements. The improvement plan be transferred to the next improvement cycle.</p>

**Option No. 4**

The projects will be extended.

New products  
Other sections of the corporation

**Result: a well-founded proposal to the Management of the corporation or business unit**

**Decision on Communication about Product Stewardship**

When the management review is held, it may be decided to communicate internally and/or externally about the vision, ambitions and results achieved in the field of Product Stewardship. Internal communication about the projects that have been carried out can have an encouraging effect on other sections of the corporation. In this way the knowledge and experience acquired can be shared as well.

It may also be considered to include the development in the field of Product Stewardship in the environmental or financial annual report or other external publications, in the field of Responsible Care, for example.

**Table 9 Connection with ISO 14001**

<b>Phase 5</b>	<b>Management review</b>	<b>ISO 14001</b>
	<b>Steps (according to manual)</b>	
5.1	Added value of Product Stewardship projects	4.6 + 4.4.3
5.2	Realisation of objectives and effectiveness of PS projects	ditto
5.3	Decision on continuation and extension of Product Stewardship	ditto
5.4	Adjustment of (initial) vision	ditto
5.5	Decision on communication about Product Stewardship	ditto

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**Explanatory notes to the connection between PS and ISO 14001 sections**

**Assessment by the Management**

The elements of Phase 5: 'Management review' described above are fully identical to Section 4.6 of ISO 14001.

**Communication**

Internal communication on realised Product Stewardship projects. Informing business managers who are not yet involved in the development of Product Stewardship about the projects in progress can have a stimulating effect. This method also enables to communicate about the thematic approach with respect to content to Product Stewardship projects. As a matter of fact you may think in this connection of the publication of articles in corporate news letters or of organising seminars or workshops.

### 3. SCALING UP AND ANCHORING OF PRODUCT STEWARDSHIP

#### 3.1. Scaling up

The number of projects and the need for steering, co-ordination and formalisation of the system are gradually increasing. This chapter provides some points for special attention when the initiatives with respect to Product Stewardship are being scaled up.

After passing the first cycle, you have a better insight into the added value and practical feasibility of Product Stewardship. For the second cycle it may be decided on this basis:

- to extend the number of projects; other applications may be chosen for the selected product or a new product may be selected.
- to realise interesting possibilities of improvement; they can be included in the (environmental management) programme.
- to make the quick scan LCA already carried out more profound or to make it better; the white spots which still exist are filled.

The next cycles bring new questions and activities. On the basis of the projects that have been carried out, a distinct picture of the added value of Product Stewardship emerges. Besides, the corporation gets some idea of the most effective and efficient way to shape Product Stewardship. Gradually more attention can be paid to formalisation of the system. If desired, standard procedures can be developed and the results of the projects can be internally and externally communicated.

Table 10 illustrates the transition of a thematic approach to Product Stewardship to the development of a management system. Each column shows the most important characteristics of a cycle of the management system for each phase (as described in Chapter 2).

The steps passed during the first improving cycle are repeated. In the second and third improving cycles new elements are added:

Below we give you for each phase some examples of how the management system can develop in the course of time.

In Phase 1, management commitment, the decision on further development and implementation in the second and third cycles be based on a well-founded cost-benefit analysis. The number of projects and participating sections of the corporation is increasing. This has consequences for planning (Phase 2). After the first two cycles have been passed, realisation of Product Stewardship projects (Phase 3) can be improved and standardised. By developing performance indicators and an audit protocol, the effectiveness of the management system can be improved (Phase 4). In Phase 5, that of management review, an increasingly better insight is obtained into the added value (benefits) and the means needed (cost). This will make it easier to make the decision in Phase 1.

**Table 10** *Development of a management system for Product Stewardship (PS)*

	1 <sup>st</sup> cycle	2 <sup>nd</sup> cycle	3 <sup>rd</sup> cycle
<b>Phase 1</b> Management Commitment	<ul style="list-style-type: none"> <li>▪ Decision by the Management on the development of PS</li> <li>▪ Formulation and propagation of vision on PS</li> </ul>	<ul style="list-style-type: none"> <li>▪ Decision on continuation and/or extension of the projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Decision on extension of PS based on the added value of PS vs. investments needed</li> </ul>
<b>Phase 2</b> Planning	<ul style="list-style-type: none"> <li>▪ Selection of product</li> <li>▪ Formation of project team</li> <li>▪ Drawing up of project definition</li> </ul>	<ul style="list-style-type: none"> <li>▪ Selection of products</li> <li>▪ Composition of product groups</li> <li>▪ Drawing up of more project definitions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Selection of product groups</li> <li>▪ Selection of corporate sections for introduction of PS</li> <li>▪ More business managers and project leaders are made re-</li> </ul>

	1 <sup>st</sup> cycle	2 <sup>nd</sup> cycle	3 <sup>rd</sup> cycle
<b>Phase 3</b> Realisation and implementation	<ul style="list-style-type: none"> <li>▪ Realisation of pilot project</li> <li>▪ Chain analysis</li> <li>▪ Identification/analysis of possibilities of improvement</li> <li>▪ Improvement plan</li> </ul>	<ul style="list-style-type: none"> <li>▪ Improved realisation of PS projects</li> <li>▪ Deepening and validation of chain analysis</li> <li>▪ Intensification of contacts with customers and suppliers</li> <li>▪ Realisation of more projects</li> <li>▪ Implementation of options of improvement</li> </ul>	<ul style="list-style-type: none"> <li>▪ Realisation of more projects</li> <li>▪ Implementation of options of improvement</li> <li>▪ Drawing up of general directives</li> <li>▪ Consequences for existing and the development of new routines</li> </ul>
<b>Phase 4</b> Monitoring and corrective measures	<ul style="list-style-type: none"> <li>▪ Monitoring of adjustment of realisation of pilot projects</li> <li>▪ Adjustment of plan for pilot projects</li> </ul>	<ul style="list-style-type: none"> <li>▪ More steering and co-ordination in view of extension of projects</li> <li>▪ Building of database for chain analysis</li> </ul>	<ul style="list-style-type: none"> <li>▪ Development of performance indicators for PS</li> <li>▪ Further development of database for chain analysis</li> <li>▪ Development of audit for assessment of the effectiveness of the management system</li> </ul>
<b>Phase 5</b> Management review	<ul style="list-style-type: none"> <li>▪ Evaluation of pilot project</li> <li>▪ Added value and practical feasibility of PS</li> <li>▪ Preparation for decision on extension of projects</li> <li>▪ Adjustment of vision on PS</li> </ul>	<ul style="list-style-type: none"> <li>▪ A better insight into the added value of PS</li> <li>▪ Preparation for decision on extension to other sections of the corporation</li> <li>▪ Decision on (internal) communication about successful pilot projects</li> <li>▪ Further underpinning and highlighting of vision on PS</li> </ul>	<ul style="list-style-type: none"> <li>▪ Extensive evaluation (cost-benefit analysis of PS) of development and introduction</li> <li>▪ Decision on external communication</li> </ul>

### 3.2. Anchoring of product stewardship in the organisation

Product Stewardship can be anchored in the organisation in various ways. Although continuous improvement of the HSE aspects of products from the perspective of the entire life cycle is relatively new to many companies, it is not necessary, and in many cases not even desirable, to develop a separate management system for Product Stewardship. One of the possibilities is to link Product Stewardship to the existing environmental management system. This is the line being followed by the Dutch Government and VNO-NCW (*Dutch employers' federation*). This is one of the reasons why this manual has been laid out according to ISO 14001.

Also here we find a cyclic management system aimed at continuous improvement. Product Stewardship adds emphasis on the product and product chain to this. Chapter 2 describes the link of the system proposed for the development and implementation of Product Stewardship to ISO 14001 for each section.

In Appendix C you will find a conversion table which summarises the link between the two systems from the perspective of ISO 14001. It specifies for each section and article how it corresponds to the management system for Product Stewardship.

We wish to stress that other ways exist to anchor Product Stewardship in the organisation. It can be linked to quality management. The model designed by the European Foundation for Quality Management (EFQM) shows great similarity at some points. Elements of Product Stewardship can also be integrated into the business planning cycles of innovation projects of the corporation.

Obviously it is up to the corporation to investigate, on the basis of the knowledge and experience acquired in the process of passing through the first cycle, in what way Product Stewardship can be best integrated into management.

**Possibilities to anchor Product Stewardship in the organisation**

- Linking to ISO 14001
- Integration into quality management (EFQM)
- Integration into business planning cycles or innovation projects

## *Appendix A*

# **Checklist Product Stewardship**

## CHECKLIST PRODUCT STEWARDSHIP

The checklist contains the most important components of the management system, as described in Chapter 2. It can also be used for the annual evaluation by VNCI. A score can be assigned to each question. The meaning of the scores is consistent with the evaluation in the framework of the Responsible Care Programme (which is part of Product Stewardship).

- I *No plan*
- II *Not applicable*
- III *Plan has been made*
- IV *Plan has been elaborated*
- V *Plan has been realized*
- VI *Continuous/documentated improvement*

### Checklist for the evaluation of the state of affairs with regard to Product Stewardship

Item	Score	Not applicable	Connection with Responsible Care Evaluation
<b>1 Management commitment and formulation of vision</b>			
Has the management of the corporation:			
1.1 formulated a vision on Product Stewardship?	I III IV V VI	II	
1.2 formulated a strategic intention (long-term target)?:	I III IV V VI	II	
1.3 propagated the vision?			
▪ within the corporation?	I III IV V VI	II	5.4
▪ outside the corporation?	I III IV V VI	II	5.3
1.4 decided to start Product Stewardship projects?			
▪ number of business units:	I III IV V VI	II	
▪ number of Product Stewardship projects for each business unit:			
<b>2 Planning</b>			
2.1 Have concrete products or product groups been selected for Product Stewardship?	I III IV V VI	II	5.1
2.2 Have project definitions been drawn up under the direction of the responsible business manager for the various Product Stewardship projects?	I III IV V VI	II	5.1
2.3 Have multidisciplinary teams been formed to carry out the projects?	I III IV V VI	II	

Item	Score	Not applicable	Connection with Responsible Care Evaluation
<b>3 Realisation and implementation</b>			
3.1 Have the multidisciplinary teams been informed about the backgrounds of Product Stewardship and have they been involved actively in the realisation of the projects?	I III IV V VI	II	5.4
3.2 Have the product chains for the selected products and product groups been charted?	I III IV V VI	II	5.2
3.3 Have the HSE aspects of all relevant links in the chain of selected products been identified?	I III IV V VI	III	5.2/5.3
3.4 Have the possibilities of improvement been identified? ▪ Workshops with Product Stewardship team ▪ Workshop with partners in the chain	I III IV V VI I III IV V VI	II II	5.2 5.3/5.4
3.5 Have the possibilities of improvement been analysed, with priorities being set, and have they been described in a plan of improvement?	I III IV V VI	II	5.2
3.6 Have proposals been made to realise the possibilities of improvement that have been given priority?	I III IV V VI	II	5.2
<b>4 Monitoring and corrective measures</b>			
5.1			
4.1.a Is the progress of the Product Stewardship projects being monitored?	I III IV V VI	II	
4.1.b Are the improvements in the HSE profile of the product being charted?	I III IV V VI	II	
4.2 Is the effectiveness of the Product Stewardship management system being monitored?	I III IV V VI	II	
<b>5 Management review</b>			
5.1 Is the added value of Product Stewardship being analysed?	I III IV V VI	II	

Item	Score	Not applicable	Connection with Responsible Care Evaluation
5.2 Are measures being taken to increase the effectiveness of the Product Stewardship management system?	I III IV V VI	II	
5.3 Is the Management actively involved in the decision process about continuation or extension of Product Stewardship projects?	I III IV V VI	II	
5.4 Is the formulated vision being adjusted on the basis of the knowledge and experience acquired?	I III IV V VI	II	
5.5 Are at management level decisions being made about (external) communication about Product Stewardship?	I III IV V VI	II	5.3

## *Appendix B*

# **REFERENCES AND ADDRESSES MAKING THE LIFE CYCLE ANALYSIS**

## REFERENCES AND ADDRESSES

### MAKING THE LIFE CYCLE ANALYSIS

#### BACKGROUND INFORMATION

Charting the HSE aspects of a product from the perspective of the product chain as a whole is one of the most important components of Product Stewardship. This lies the basis for identification of possibilities of improvement and exchange of information and co-operation with suppliers and customers. The sections 2.3.2 to 2.3.5 summarise a number of important aspects of the process of making the chain analysis. The selection of publications below provides a survey of the (scientific) as-is situation with regard to the life cycle analysis (LCA). Besides two recent publications on product-based environmental care have been included.

- European Union System for the Evaluation of Substances (EUSES), Environment Institute, European Chemicals Bureau, Joint Research Centre, Ispra, Varese, Italy.
- European Commission, Regulation No. 1488/94 to establish the principles for assessment of risks for man and environment of existing substances pursuant to Regulation No. 793/93 issued by the Council on 28<sup>th</sup> June 1994.
- Goedkoop, M.J., De Eco-indicator 95, eindrapport (*The Eco-Indicator 95, Final Report*); NOH Report 9514, July 1995.
- Heijungs, R. et al; 'Milieugerichte levenscyclusanalyses van producten, handleiding en achtergronden' (*Environment-oriented life cycle analyses of products, guide and backgrounds*) NOH Report 9253 and 9254, Leiden, 1992; by order of the Nationaal Onderzoekprogramma Hergebruik van Afvalstoffen (*National Research Programme on Re-use of Waste*) (NOH), in co-operation with CML, TNO and B&G.
- Ministry for Housing, Spatial Planning and the Environment, 'Productgerichte milieuzorg, uitleg en praktijkervaringen', (*Product-based environmental care, Explanation and Practical Experiences*) October 1998.
- SETAC, Society of Environmental Toxicology and Chemistry, Guidelines for Life Cycle Assessment, a 'Code of Practice', Brussels, 1993
- Simapro, Database software program based on the ICA method, Pré Consultants, Amersfoort.
- VNO-NCW (*Dutch Employers' Association*), 'Productgerichte milieuzorg, de eerste stappen op weg naar een product dat het milieu minder beïnvloedt' (*Product-based environmental care, the first steps towards a product which has less impact on the environment*), August 1998.

## *Appendix C*

# **CONVERSION TABLE FOR ISO 14001- MANAGEMENT SYSTEM FOR PRODUCT STEWARDSHIP**

## CONVERSION TABLE FOR ISO 14001

ISO 14001	Management System for Product Stewardship
4.1 General requirements	1.1
4.2 Environmental policy	1.1 + 1.2
4.3 Planning	
4.3.1 Environmental aspects	2.1 + 3.2 to 3.5
4.3.2 Statutory and other requirements	1.1 + 1.2 + 3.2 to 3.5
4.3.3 Objectives and tasks	1.1 + 1.2 + 1.4 + 2.3 + 3.5 + 3.6 + 5.2 + 5.3 + 5.4
4.3.4 Conservation programmes	3.5 + 3.6
4.4 Implementation and realisation	
4.4.1 Structure and responsibility	2.2 + 2.3 + 5.4
4.4.2 Training, awareness and professional skill	1.3 + 3.1 + 2.3
4.4.3 Communication	1.2 + 3.1 + 3.3 + 3.4
4.4.4 Documentation of conservation system	To follow after formalisation of management system
4.4.5 Documents management	To follow after formalisation of management system
4.4.6 Operations control	2.2 + 2.3
4.4.7 Preparedness and response to emergencies	3.3
4.5 Control and corrective operations	
4.5.1 Monitoring and measuring	4.1
4.5.2 Deviations and corrective measures	4.1
4.5.3 Registrations	4.1
4.5.4 Conservation system audits	4.2