

# Products in environmental management systems: drivers, barriers and experiences

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## Abstract

Do standardised environmental management systems (EMS) lead to improved environmental performance? This depends on to what extent these systems lead to changes in important flows of material and energy, which for manufacturing companies, in turn, mean that the product development process is important. Consequently, it appears vital to investigate the connection between EMS and 'Design for the Environment' (DFE), i.e. the connection between these management systems and concepts that deal with environmental issues in product development.

This paper presents product-oriented environmental management systems (POEMS), including characteristics of existing models, experiences from projects where these models have been tested and experiences concerning the product connection in 'normal' EMS. It includes a discussion of important factors influencing to what extent DFE activities are integrated into EMS and/or the outcome of such integration.

There are many motives for integrating the two concepts. Firstly, DFE thinking might enrich EMS by contributing with a life-cycle perspective. If EMS encompassed products' life cycles to a greater extent, they would be a better complement to the often facility-oriented legal requirements and authority control. Secondly, EMS might remove the pilot project character of DFE activities and lead to continuous improvement. Thirdly, integration could lead to successful co-operation, both internally and externally. However, existing studies show that there is a mixed picture concerning the extent 'normal' EMS currently encompass products. © 2004 Elsevier Ltd. All rights reserved.

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## 1. Introduction

Today, more than 57,000 companies are using standardised environmental management systems<sup>1</sup> (EMS) in the world<sup>2</sup> [3] and this number is expected to continue to grow steadily [4]. Therefore, it is interesting to study if and how standardised EMS's affect companies' environmental impact. It is the authors' experience that many companies, authorities and individuals regard a certification in accordance with ISO 14001 as a guarantee for good environmental performance. However, it appears to be too early to draw any general conclusions on

the connection between standardised EMS and environmental performance, because there are research findings pointing in both positive and negative directions [5].

Since environmental impacts are intimately connected to flows of materials and energy, and the most important flows, at least for manufacturing companies, are closely linked to products (cf. [6,7]) it seems urgent for management systems to encompass products and product development. Consequently, it is of great interest to illuminate how standardised EMS are related to Design for the Environment<sup>3</sup> (DFE), i.e. to what extent

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<sup>1</sup> i.e. EMS fulfilling the requirements of ISO 14001 [1] and/or the European Union's regulation Eco-Management and Audit Scheme (EMAS), [2].

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<sup>3</sup> DFE is defined as: "A practice by which environmental considerations are integrated into product and process engineering procedures. Design for Environment (eco-design) practices are meant to develop environmentally compatible products and processes while maintaining product, price, performance and quality standards" ([8], a definition of eco-design).

they encompass the products and product development procedures. To deal with these issues, this paper aims to elucidate the following topics:

- What are the incentives to strengthen the connection between EMS and DFE?
- How can DFE activities be incorporated into standardised EMS?
- How common is it that EMS encompass DFE activities?
- What are the experiences from projects where EMS and DFE activities have been integrated?
- Which important factors influence to what extent EMS and DFE activities are integrated and/or the outcome of such integration?

## 2. Products in environmental management systems

Historically, DFE and EMS have, to a large extent, existed in separate spheres [9]. Reading through ISO 14001 it is clear that product development is not emphasised and that most product-related requirements leave substantial room for interpretation [10]. Therefore, it is uncertain to what extent normal EMS encompass and influence the environmental load of products. However, in 1995 the Dutch government introduced a product policy with the intention of changing the behaviour of producers ([11], as referred to in [12]). This was to be accomplished through the implementation of product-oriented environmental management systems (POEMS). A POEMS is an EMS with a special focus on the continuous improvement of a product's eco-efficiency (ecological and economic) along the life cycle, through the systematic integration of eco-design in the company's strategies and practices [13]. This Dutch product policy can be seen as a starting point for the wide use of POEMS. Since such management systems are constructed to handle product issues they serve well as a basis for this paper. We distinguish between 'normal' EMS and POEMS, where the first category includes standardised EMS that may encompass products and the second comprises systems prepared to specially deal with product-related issues. POEMS may be based on an existing normal EMS, but this is not necessary.

### 2.1. Motives to integrate EMS and DFE concepts

Sinding [14] argues that traditional environmental policy in many respects encourages an internal, firm-centred focus. He wants companies to apply an approach that transcends the boundaries of the individual firm and to actively engage in inter-organisational environmental management. However, it is clear that products and product development are not within

the main focus of ISO 14001 and its application [10,15]. According to Cramer [16] the primary focus of EMS has initially been on procedures to reduce emissions through process improvements. Moreover, Klinkers et al. [17] are of the opinion that EMS are usually directed at site levels, which is supported by others [9,10,12,18]. This indicates that EMS often lack a life-cycle perspective and are not primarily focused on products. Ries et al. [18] state that, in spite of the inclusion of 'activities, products and services' in vital parts of the ISO 14001 standard [1], many companies have a very narrow perception of their environmental impacts, which is mostly limited to site-specific activities. All these facts show that there is an obvious risk that EMS are not directed at the most important environmental aspects. Environmental managers that Ries et al. [18] have interviewed stated that companies generally have very limited knowledge regarding the environmental aspects of their products. Further studies by Ammenberg and Hjelm [15] and Hjelm et al. [19] show that there are certified EMS without a strong link to products.

From an environmental standpoint, it is important to regard the whole life cycle of a product. In this respect, 'DFE thinking' or 'life-cycle thinking' could function as an important complement to EMS by contributing a better understanding of which flows of materials and energy are most important (cf. [20]), which would reduce the risk of sub-optimisations. A substantial idea behind POEMS is that they should improve the co-operation in the entire supply chain (from material extraction to end-of-life treatment). POEMS are supposed to lead to concerted environmental action among the actors within a product's life cycle, which is to be commercially beneficial [12]. This is in line with the thoughts of Sinding [14], whose inter-organisational environmental management is intended to lead to learning about environmental impacts throughout the supply chain and to interaction with other firms in the supply chain to reduce these impacts. A change in focus of EMS, from site-specific to encompass the life cycle of products, is also motivated from an environmental policy perspective. If EMS to a greater extent encompassed products' life cycles, they would be a better complement to the often facility-oriented legal requirements and authority control.

Many researchers have developed tools for integration of environmental aspects into the product development process<sup>4</sup>. Although there are quite a lot of DFE-tools developed by academia and industry, few have made a significant breakthrough so far. According to McAloone [22], not much effort has been made on how to integrate these methods into the design process (cf. [23]). Lenox and Ehrenfeld [24] state that many tool

<sup>4</sup> For a good description and characterisation of various DFE (eco-design) tools, see e.g. [21].

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