

# Eco-efficiency in the Finnish EMAS reports—a buzz word?

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## Abstract

The aim of the study reported here was to examine whether the concept of eco-efficiency is incorporated into Finnish EMAS reports. The analysis was based on the frameworks proposed by the WBCSD (Measuring eco-efficiency. A guide to reporting company performance. Geneva: World Business Council for Sustainable Development; 2000) and Müller and Sturm ([http://www.ellipson.com/download/studies/studies/EcoEfficiency\\_Indicators\\_e.pdf](http://www.ellipson.com/download/studies/studies/EcoEfficiency_Indicators_e.pdf)). Our empirical sample consisted of 40 EMAS statements and eight group environmental reports. The concept of eco-efficiency has clearly not become popular in corporate environmental reporting in Finland. It is often assumed that eco-efficiency would translate the concept of sustainable development into specific terms. Our findings suggest that this is not the case, at least not in Finnish environmental reporting.  
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## 1. Introduction

The concept of eco-efficiency emerged in the 1990s as a “business link to sustainable development” [1–3]. It has become customary to define it as a combination of economic and environmental (ecological) efficiencies, expressed by the ratio:

$$\text{Eco-efficiency} = \frac{\text{Economic value (added)}}{\text{Environmental impact (added)}} \quad (1)$$

*Abbreviations:* AOX, adsorbable organic halogens; BOD, biological oxygen demand; CERES, Coalition for Environmentally Responsible Economies; COD, chemical oxygen demand; CO<sub>2</sub>, carbon dioxide; EC, European Community; EEA, European Environment Agency; EMAS, Eco-Management and Audit Scheme; GHG, greenhouse gas; GRI, Global Reporting Initiative; ISO, International Organisation for Standardisation; ODS, ozone depleting substance; ROCE, return on capital employed; ROI, return on investments; UNCTAD, United Nations Conference on Trade and Development; UNEP, United Nations Environment Programme; WACC, weighted average cost of capital; WBCSD, World Business Council for Sustainable Development.

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A reversed formula, eco-efficiency = environmental performance/financial performance, has been presented by, e.g., Müller and Sturm [4], which is of course equally valid mathematically.

According to Eq. (1), eco-efficiency is improved by reducing the environmental impact added while maintaining or increasing the value of the output produced. Although social aspects are an essential part of sustainable development, they are not—yet—embedded in the concept of eco-efficiency.

For the time being, there are a variety of recommendations for eco-efficiency indicators published by organisations such as the World Business Council for Sustainable Development (WBCSD) [2], Ellipson Ltd.—a Swiss consulting firm, in this article referred to as Müller and Sturm [4]<sup>1</sup>—and the European Environment Agency (EEA) [6]. The International Organisation for Standardisation (ISO), the Coalition for Environmentally Responsible Economies (CERES), the United Nations Environment Programme (UNEP) and the United Nations Conference on Trade and Development

<sup>1</sup> See also Sturm et al. [5].

(UNCTAD) are other forerunners pursuing consistent environmental and sustainability reporting.<sup>2</sup>

We compared the frameworks outlined by the WBCSD [2] and Müller and Sturm [4] in order to find out how eco-efficiency could be reported. Establishing a globally acceptable standard for eco-efficiency reporting is the aim of both of the frameworks. Neither of them, however, recommends publishing stand-alone eco-efficiency reports. Instead, eco-efficiency indicators should first be incorporated into company environmental reports, and later on they might become a part of company financial reporting as well.

Both frameworks emphasize the importance of comparability—over time and between reporting entities. Other important principles in reporting, as derived from financial reporting, are: completeness, accuracy, clarity, neutrality, timeliness, auditability, transparency and relevance.<sup>3</sup>

Eco-efficiency indicators form the core of the recommendations of the WBCSD and Müller and Sturm. The economic variable in Eq. (1) can be expressed either in monetary terms (sales, value added) or in physical terms (quantity of production). The WBCSD [2] proposes net sales and quantity of production, whereas Müller and Sturm [4] only acknowledge value added (= sales minus costs of goods and services purchased)—and later on, net value added (= value added—depreciation of tangible assets) in Sturm et al. [5]. The environmental items also differ from framework to framework (Table 1), but they essentially cover the same areas of environmental concern: energy consumption, water consumption, greenhouse gas emissions, ozone depleting substances as well as materials consumption and waste generated.<sup>4</sup> Eco-efficiency indicators are calculated by combining the economic and environmental variables. Readers interested in the eco-efficiency concept and reporting can find illustrative examples in both Müller and Sturm [4] and WBCSD [2]. Müller and Sturm, e.g., discuss the link between sales, purchased goods and value added and stress the importance of using the same system boundaries when calculating the economic and the environmental items.

<sup>2</sup> The CERES and the UNEP are key participants in the Global Reporting Initiative (GRI) [7], a multi-stakeholder process and independent institution whose mission is to develop and disseminate globally applicable sustainability reporting guidelines. The GRI became independent in 2002, and is an official collaborating centre of the UNEP.

<sup>3</sup> These principles altogether enable a “true and fair view”, which is an international requirement and is also the very basis for any (accounting) information disclosed.

<sup>4</sup> These concerns are regarded as universal (generally applicable), others are considered business-specific. The WBCSD [2] states that business-specific indicators are useful internally.

Table 1

The universal environmental items included in the frameworks proposed by the WBCSD [2] and Müller and Sturm [4]

Environmental influence indicators [2]	Environmental performance indicators [4]	Similarities or differences
Energy consumption <sup>a</sup>	Non-renewable primary energy input	Differences
Water consumption <sup>b</sup>	Water use	Essentially the same
Greenhouse gas (GHG) emissions <sup>c</sup>	Global warming contribution <sup>c</sup>	Essentially the same
Ozone depleting substance (ODS) emissions <sup>d</sup>	Contribution to ozone depletion <sup>d</sup>	Essentially the same
Materials consumption or total waste <sup>e</sup>	Waste disposed	Differences

<sup>a</sup> Total sum of energy consumed (equals energy purchases less energy sold to others for their use), including: electricity and district heat, fossil fuels, other fuel based energy, non-fuel based energy.

<sup>b</sup> Sum of all fresh water purchased from public supply or obtained from surface or ground water sources.

<sup>c</sup> GHG: see the Kyoto Protocol or Refs. [4] and [5].

<sup>d</sup> ODS: see the Montreal Protocol or Refs. [4] and [5].

<sup>e</sup> Materials consumption = sum of weight of all materials purchased or obtained from other sources, including raw materials for conversion, other process materials (such as catalysts, solvents), and pre-manufactured or semi-manufactured goods and parts. *This is a generally applicable indicator.* Total waste = total amount of substances or objects destined for disposal. Can be further identified according to the type of waste (e.g., hazardous, non-hazardous) or final destination (e.g., landfill, recycling or incineration). *This is a potential generally applicable indicator.*

The WBCSD's framework [2] has a company perspective, whereas the model proposed by Müller and Sturm [4] is focused on the needs of financial markets. The former aims to illustrate how companies could measure eco-efficiency and identify possible eco-efficiency improvements. Although eco-efficiency indicators are seen as an internal management tool, the WBCSD also recommends that eco-efficiency is communicated to stakeholders as a part of a company environmental report. The framework of Müller and Sturm is interested in finding the connection between environmental performance and (future) financial performance. They feel that eco-efficiency indicators enhance the true and fair view concept and that it is in the interest of an investor to get information that a company is reducing damage to the environment while increasing, or at least not decreasing, the shareholder value.

The terminology used differs from framework to framework. The WBCSD [2] refers to the environmental influence of product/service production (or use), whereas Müller and Sturm [4] prefer to use environmental performance as a reference item (Table 1). The other item in the eco-efficiency ratio, Eq. (1), is called product or service value by the WBCSD and financial performance by Müller and Sturm. Here the main difference also

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