A Holistic Approach to Sustainable Construction

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ABSTRACT

Skanska is one of the leading companies active in construction-related services and project development in some 50 countries. Environment became a strategic issue for the whole Group in 1995 and by the end of 2000 all units within the Group will be certified according to ISO 14001. This serves as a platform for addressing environmental issues throughout the construction process.

THIS IS SKANSKA

Skanska's mission is to develop, build and maintain the physical environment for living, travelling and working. Skanska is active in construction-related services and project development in some 50 countries. Annual sales are about US $11 billion and Skanska has some 60,000 employees. Operations are organised into a parent company, Skanska AB, with five business areas. Contracting operations, which provide services related to building and civil construction, take place in the Skanska Sweden, Skanska USA and Skanska Europe business areas. They all possess product-oriented specialist knowledge as well as project development know-how.

The Project Development and Real Estate business area focuses on project development in which Skanska commits its own funds. The Services business area, which is the most recently established, works with facilities management and the development of services that are related to management of commercial buildings.

The activities of Skanska are thus very diversified, from building private houses to heavy civil construction like tunnels, bridges or dams and project development for its own account, as well as facilities management and related services. Common aspects of our products are that they:

- have a long lifetime
- consist of many components
- are tailor-made for the site and to suit client demands
- are utilised to host various activities
- have a major impact on the use of resources in society.

SKANSKA AND THE ENVIRONMENT

Skanska began to apply its strategic approach to environmental issues in 1995, although many activities at project level had already been going on for a long time. This was a period when all large Swedish construction companies took environment on board as a strategic issue. The reasons were demands from public agencies concerning waste management and recycling, combined with growing client awareness.

RISKS AND OPPORTUNITIES

When environmental issues were originally introduced in Swedish business in general, the emphasis was very much on the risks, while the opportunities came in much later (Figure 2).

At Skanska we started to work with various projects focused on improving resource efficiency, both in the energy and waste sectors. We focused less on accident risks until...
an unfortunate chemical accident occurred in a project in southern Sweden where Skanska was the contractor. This had a profound impact on the way Skanska handled environmental issues. The lesson learned was that it is equally important to address both risks and opportunities.

**Introducing ISO 14001**

In 1998 the management of Skanska made a strategic and far-reaching decision. All units within the Group would introduce environmental management systems within less than two years (by the end of 1999) and have them certified by the end of 2000. Some companies in other industrial sectors had made similar decisions earlier. The difference, however, was that they had a large but reasonable number of factories to include in their system, while Skanska had about 10 000 large and small projects that needed environmental management. This was a great challenge. Thanks to enormous efforts throughout the organisation, we are well on our way and will meet our target by the end of 2000.

**Significant environmental aspects**

One result of the task of introducing ISO 14001 has been that all units have worked to identify the significant environmental aspects in their projects. Figure 3 provides a brief overview of the environmental aspects that have been highlighted as being particularly important. Their importance varies over the life cycle of a project, from land use planning to construction, service life and demolition.

**A project organisation**

Although ISO 14001 is a powerful management tool, it does not solve all problems. On the contrary, it becomes more apparent that you need a set of more technical tools to develop and communicate your performance. The challenge is not only to develop these tools, but also to put them into operation in a project-oriented organisation: an organisation where every product is unique, tailor-made and specified by the client.

**The contractor's roles**

The contractor's various roles have a great impact on the potential to influence environmental considerations and solutions in a project. In general, the aim is to enter the development process as early as possible. A project in which the contractor is also the developer of course provides the greatest degree of freedom. On the other end of the scale are contracts in which the client specifies every detail. This is particularly common for public procurement. Somewhere in between are 'performance contracts' and 'turnkey contracts'.

The construction of Scandic Hotel in Helsinki is an example of a unique cooperation to enhance the environmental standard of the project (Figure 4). The user, owner and contractor have jointly developed a construction process that incorporates environmental considerations. The project involves acquisition, production and maintenance in a life-cycle perspective.

An example of a more traditional contract is the Öresund Bridge, which connects Denmark and Sweden (Figure 1). The contract was awarded through public procurement where environmental performance played an important role. The experience from the environmental work can be summarised in five key points:

- A client with clear environmental demands
- An extensive environmental impact assessment
- A commitment to environmental work by all parties
- A skilled and responsible contractor
- Good follow-up and evaluation programmes

**A construction project**

The following section describes the stages of a construction project, together with example of tools that have been developed (Figure 5).

In particular, many large projects include risks that have to be identified and addressed. In addition to technical, financial and legal risks, Skanska's risk assessment also includes environmental issues and sociopolitical issues. In the environmental field, a risk assessment takes into account such aspects as significant environmental impact, contaminated soil and relations with clients and suppliers.

The sharing of knowledge and experience is a key factor...
in developing new solutions. One tool that Skanska has developed is a project database, which is available internally on our intranet. A selection of projects with environmental dimensions is also available and regularly updated on our public Web site. This enables clients and other stakeholders to see a variety of environmental solutions that Skanska has applied.

The design phase is critical for the environmental impact of a project. It is at this stage that technical solutions are specified. This becomes even more apparent if we bear in mind that the service life phase accounts for 80 to 90 percent of the environmental impact of a structure. To help designers with their decisions, Skanska has developed the Ecometer, a computer tool for comparing and selecting materials, building components and systems. The Ecometer is based on a life cycle approach, in which a structure's contributions to climate change, acid rain and two more environmental aspects are factored in. It is being tested in practice in projects in Finland (Figure 6).

In order to ensure that the materials used in a structure do not contain unwanted chemicals, Skanska has developed a database of chemical products in Sweden. About 2000 products have been evaluated and compared with our own lists of prohibited chemicals and chemicals which are to be phased out.

Finally, when a project is completed it is handed over to the customer together with all relevant documentation. A new element in this documentation is an environmental logbook. It contains descriptions of the structure's environmental characteristics, including environmental product declarations for its constituent building materials.

Other tools include an environmental manual to help the project address environmental issues, especially during the construction phase.

CONCLUSIONS

Environmental management systems provide the necessary framework for integrating environmental issues into the various activities of a construction company. The ISO 14001 certification process is an important element in focusing the attention of the organisation on these issues. It is, however, also important to have more operational tools that can provide practical support. Experience shows that when new categories of employees in the organisation make the environment a part of their duties, they start requiring new tools. Of course these changes cannot occur overnight. They take time, and the tools are not applied throughout the organisation from the beginning.

Results are not measured in the number of environmental certificates, but in practical daily environmental work. It is a living process, in which the integration of environmental issues into all operations is the key to success.

ABOUT THE AUTHOR

Mr Wenblad joined Skanska in 1999 as Vice President Environmental Affairs. Mr Wenblad has also worked for AB Volvo 1990-1994, coordinating environmental affairs. Earlier assignments include the Swedish Environment Protection Board, Ministry of Environment and Government Committees in Sweden. During 1975–1980 Mr Wenblad had various assignments for the Food and Agriculture Organisation (FAO) and the United Nations Environment Programme (UNEP) in the field of marine pollution. Mr Wenblad has an MSc in biology and chemistry and has worked with environmental issues since 1972.

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