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UN House, Norway

Case Study 48

The UN House in Arendal, Norway, has been rebuilt into an energy efficient, carbon neutral building with a double box facade, and sources renewable energy from a solar water heating system and geothermal energy from the sea.

Aspects of Sustainability

This project highlights the following:

Social Aspects

Human Resources
Corporate Community Involvement
Business Ethics
Health and Safety

Environmental Aspects

Energy and Climate
Materials
Ecosystems
Local Impacts

Economic Aspects

Project Selection
Supply Chain
Value Added



Project Introduction

The UN House, located on the seafront of Arendal city, in southern Norway, has been completely rebuilt into the modern headquarters of the Global Resource Information Database (GRID), which is an environmental resource organisation and part of the United Nations Environment Programme (UNEP). The building was originally constructed in the 1960s and was energy inefficient with poorly insulated walls and windows. GRID acquired the building in 2000 with the intention of refurbishing it into an energy efficient office that reflected the organisation's carbon neutral objectives and commitment to environmental responsibility.

Skanska Norway was the general contractor of the US\$ 6.2 million redevelopment for GRID and the Arendal municipality. The project retained the

main concrete structure of the building and was completed three months ahead of schedule on a build and design contract. GRID relocated to the rebuilt 2,300 m² UN House in October 2006. The UN House also contains a wellness centre and the Arendal International School, which focuses on environmental issues and cultural awareness.

In 2007, the UN House was a Glassbjørnen Prize runner up, which is awarded by the Norwegian Foundation for Sustainable Consumption and Production (GRIP). The UNEP and GRID demanded high standards of sustainable construction for the project with regard to construction materials and techniques, energy efficiency, and renewable energy. The demands have made the UN House a model project for sustainable construction and design.

Contributing Toward Sustainable Development

The UN House is an energy efficient, carbon neutral building that sources renewable energy from a solar water heating system and geothermal energy from the sea. The building provides healthy indoor environments for GRID staff and is designed to be flexible in order to accommodate various functions and office environments, and to facilitate any future renovation work. The UN House contributed toward sustainable urban planning by reusing an existing building in central Arendal and benefits the local economy by promoting the city as a conference venue. The UN House is a model project for sustainable construction, which prioritised environmentally responsible construction materials and recycled demolition materials and construction waste. Skanska involved GRID staff throughout the project to ensure that their needs were met. The construction project benefited the local economy by utilising local construction workers and materials. Innovative construction methods and solutions were developed for the project, and the project has raised awareness of sustainable construction techniques.

Social Aspects

Stakeholder involvement

Skanska participated in an initial workshop with UNEP staff and various construction specialists to discuss how the building should be redeveloped.

Once selected as the general contractor, Skanska held a series of workshops and meetings to identify the organisation's requirements for the project, which involved all GRID staff. During the meetings, energy efficiency and indoor environmental quality were identified as the priority issues for the project and Skanska was able to integrate them into the project from the outset.

Occupational health and safety

No accidents were reported during the UN House renovation project and the Lost Time Accident Rate was zero. This was achieved by closely following Skanska's health and safety practices at all times.

Development of innovative construction techniques

Skanska and the client are members of the Green Construction Alliance in Norway, which develops and pioneers new techniques for energy efficient and environmentally responsible buildings. One such innovative technique developed for the UN House project was a double box facade, which is designed to maintain a constant indoor temperature and promote energy efficiency by reducing heat loss in winter and preventing overheating in summer. The double facade replaced the old concrete facade and has a 40 cm cavity between the inner and outer wall, which contains sensors that regulate a 20-degree temperature between the walls. Air is able to circulate within the cavity and operable windows in the outer facade allow hot air to escape during warm weather.



Healthy indoor environment

Prior to the renovation, natural light did not reach the interior corridors of the building, the ventilation did not function properly, and the building could overheat in summer and be cold in winter. Large windows were incorporated into the new facade and the interior is open planned to allow natural light to penetrate the building. The windows are fitted with coloured blinds that shade occupants from the sun and reflection from the sea. The UN house is also equipped with a high quality ventilation system and low-VOC materials were used to minimise indoor pollution. The double facade ensures a constant indoor temperature even during extreme weather. The walls are soundproofed to promote a peaceful working environment. In 2008 a UNEP questionnaire on working conditions illustrated that the GRID staff are almost 100 percent satisfied with the UN House as a workplace.

Flexible building

The interior of the UN House can be easily altered to meet the requirements of the building's present and future occupants without the need for extensive redevelopment. The interior walls can be moved to create an open planned office space or several separate offices. The ceiling height, lighting and ventilation systems can also be easily modified to accommodate different office working environments. The UN House has flexible conference facilities, such as an amphitheatre and meeting rooms that can be altered to accommodate various functions.

Raising awareness of sustainable construction

The UN House was intended to be a model project to encourage the construction industry to invest in more energy efficient buildings, and has been used by GRID as a good practice model for sustainable construction. The building has featured in the Norwegian media as an example of a sustainable and energy efficient office building, and several organisations and companies have visited the project to learn about the sustainability considerations. GRID was also chosen as the organisation within the UN to lead the organisation's carbon neutral and climate change projects. The UN house is an important element of GRID's climate change work and its status as a carbon neutral organisation.

Sustainable urban planning

The project renovated and reused an existing building in Arendal. The UN house is located in the centre of the city and has good access to

services and amenities. The building has both indoor and outdoor bicycle storage for 50 bicycles.



Economic Aspects

Local construction employment and materials

Around 70 workers were involved in the renovation, approximately 80 percent of which were from the Arendal area. Almost 70 percent of the construction materials were sourced locally or from within Norway. Locally sourced materials included all timber used on the project.

Vocational training

The entire workforce was educated on the special waste management requirements of the project. Courses on waste sorting and recycling were held for all workers and subcontractors. A university student documented the demolition waste progress during the project.

Financial savings due to energy efficiency

Energy efficiency measures have reduced the UN House's energy consumption by around two thirds compared to prior to the renovation. Some of the energy efficiency features have also increased the value of the property, such as the roof garden, which is estimated to have increased the building's market value by between 6 and 15 percent by providing extra insulation and adding an additional green space on the roof.

Local economic development

The UN House project has established Arendal as a UN conference city and GRID works in cooperation with local hotels, businesses and other institutions to further develop the city's capacity to accommodate more and larger UN conferences. The UN House has an amphitheatre on the first floor and meetings rooms to host a range of functions, seminars and conferences.



Environmental Aspects

Minimising environmental impacts during construction

During the demolition, the old concrete facade was transported to a demolition facility off-site for processing in order to avoid local noise and dust pollution. The facade was covered with protective netting and removed in sections from the site.

Environmentally responsible construction materials

All construction materials met Skanska's conventional standards, and Skanska established an additional set of standards for the project, which were met by around half the materials used in the redevelopment of the UN House. A hazardous materials list was also created and materials from the list were not used on the project where alternatives were available. The project demanded that all suppliers provided documentation to prove that construction materials did not contain any substances on the list. Additionally, as with all new public buildings in Norway, materials and substances certified by the Nordic Swan eco-label were prioritised. Non-certified materials were only used where no suitable alternatives could be found. All furniture within the UN House is environmentally certified and the building was constructed with materials that can be easily recycled in the future. Skanska Norway has used the UN House material standards on subsequent projects to encourage suppliers to provide environmentally responsible materials.

Waste management

The UNEP demanded that as much of the demolition and construction waste was recycled as possible and provided Skanska with sufficient time to recycle materials thoroughly. A total of 94 percent of all demolition and construction waste was recycled. Waste materials were sorted and stored in specific storage containers on the site

before being recycled off-site. Some of the interior materials, such as doors, kitchen fittings, lighting fixtures and office equipment was sold as second hand or given away to private individuals for free.

Energy efficiency

The UN House annually consumes around 105 kWh/m², compared to the building's annual consumption of almost 300 kWh/m² prior to the redevelopment. Energy consumption has been reduced by good insulation, energy saving devices and the efficient seawater heat pump system. The double facade provides insulation in winter and cooling in the summer. Sensors alter the ventilation and lighting according to occupancy and sun blinds are automatically lowered to shield strong sunlight and to avoid the need for cooling.

Renewable energy

The UN House generates renewable heating and cooling from a seawater heat pump system and is equipped with solar water heating panels. The seawater heat pump system provides approximately 95 percent of the building's heating and cooling requirements and consists of a 1.5 km seawater pipe system. Heat from the system is distributed within the building by a glycol central heating system. The solar water heating system meets the building's entire hot water requirements and hot water is stored in the basement to ensure a constant supply. The UN House's electricity provider guarantees the supply of 100 percent certified electricity from renewable sources.

Carbon neutral building

GRID has been a carbon neutral organisation since 2007 and required that the UN House contribute toward this objective. The UN House uses 100 percent renewable energy for heating, cooling and electricity, which does not directly produce carbon dioxide. The building is also equipped with state-of-the-art video and phone conferencing facilities to reduce the need for staff to travel for meetings.

Learning From Good Practice

The UN House fulfils the UN's sustainable development objectives and Skanska was subsequently selected as the construction manager for the UN's Capital Master Plan (CMP) renovation of the agency's headquarters in New York City. The experience of the UN House project is thought to have contributed toward Skanska's selection for the New York project.