



WWW.LIPA.NO

Introduction

The project

LIPA Environmental Project (Llnesøya PAsive house) is a broad interdisciplinary effort in which all the participants are driven by a strong environmental engagement and a desire to raise awareness and increase competency regarding sustainable architecture in the building sector and society in general. The project will complete Scandinavia's first retrofit of a single unit building to zero-energy standards.

Globally, buildings account for more than one third of our total energy consumption and greenhouse gas emissions. Increased international awareness on this issue has, among other measures, resulted in stricter building codes in several countries which promote energy efficiency and environmentally responsible building practices. However, with a history of cheap energy supply, a lack of knowledge and know-how in the building sector and with limited awareness in the general population, progress in Norway so far has been slow. Projects which can lead the way in this area are clearly needed.

Eight out of ten buildings which we will inhabit in 2050 already exist. This means that the greatest potential by far for reducing our carbon footprint lies in the existing building stock. By retrofitting an existing building to passive house standards and combining this with energy generated on site, LIPA Environmental Project aims to provide a hands-on example with regard to energy efficiency, architectural design and craftsmanship for a low carbon society. In order to maximize the transfer of knowledge and learning experiences on a local, national and international level, marketing, demonstration and dissemination activities have been given particularly high priority. With this in mind, the project provides an educational resource from the outset – collaborating with among others the Norwegian University of Science and Technology (NTNU), and secondary schools in the region.

The center

The finished building will house Bjørk Environmental Center. By making active use of the building and its striking natural surroundings for practical demonstration and educational purposes, this center aims to act as a source of knowledge and inspiration on issues related to sustainable development. The building will contain conference facilities, exhibitions, a demonstration home, a café and a range of activities (see illustration 1, on next page). Furthermore, the strategic use of art and design are important elements for both the center and LIPA Environmental Project, in order to communicate an environmental message in an innovative, accessible and exciting way. Bjørk Environmental Center will cater to a broad audience, ranging from schools and universities to private and public sector and businesses. Its location in a popular tourist region will also allow the center to attract visitors from overseas.

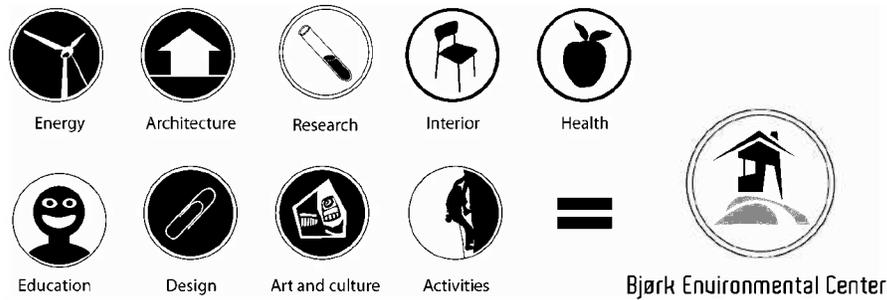


Illustration 1. An overview of Bjørk Environmental Center’s broad approach to environmental issues.

The building and its transformation

Background

The project will restore a 60 year-old traditional schoolhouse, located in beautiful surroundings on the island of Linesøya, off the coast of central Norway (approximately 64° N). The building is simply constructed and consists of a concrete basement and a timber-frame upper level with a cold attic; the façade and roof are clad with wood and slate, respectively. These qualities mean that the building represents post-war Scandinavian architecture well. This was a key factor in the selection process, so as to maximize the transferability of the project to other buildings.

The conversion into an environmental center will require a complete refurbishment of the building and site. In order to meet the standard required for certification by the Passive House Institute in Darmstadt, Germany, a range of new materials and components will be used in the building process. Nevertheless, re-use and recycling will be employed wherever possible within the remit of the project’s architectural design.

The building will be divided to create a demonstration apartment, a café and several multipurpose rooms for the center’s activities (see illustration 2, below). Flexibility of use is a priority – most rooms are therefore designed to fulfill several functions. Although the building will receive a substantial “facelift”, it will retain much of its original characteristics with respect to structural rhythm and form. The aim is to achieve a balance between a fresh approach to environmental building techniques and the building’s status as a restoration project.

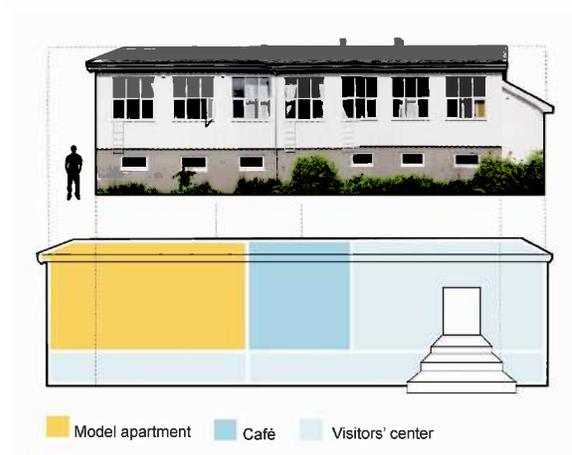


Illustration 2. Schematic view of the environmental center’s functional divisions.

Passive house retrofitting: The “Hat Method”

LIPA Environmental Project will test the “Hat Method” of retrofit insulation for buildings, developed by Saint Gobain Isover of Sweden. The method involves creating a coherent insulation layer from the roof to the façade, and from the façade to the frost protecting insulation around the building (a sort of “top hat”, see illustration 3, below). The result is that the area beneath the building is kept warm and the building loses less heat to the poorly insulated ground. The entire operation is performed on the outside and effectively eliminates thermal bridges in the construction, whilst also reducing moisture problems – a common challenge in maritime climates. In combination with energy efficient windows, the Hat Method therefore implies the construction of a new, well-insulated shell around the existing building. The method’s greatest advantage is that it theoretically can be applied to nearly any building; interior areas are essentially untouched and residents remain almost unaffected throughout the restoration process.

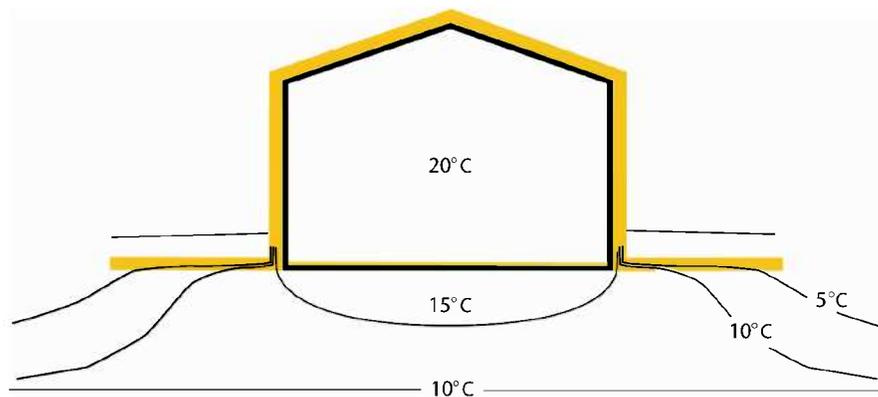


Illustration 3. The Hat Method creates a thermal pool under the building, reducing heat loss through poorly insulated foundations.

In line with normal passive house principles, shading systems will be incorporated in the architectural design, in order to minimize potential overheating during summer. These are combined with highly efficient balanced ventilation, thermal solar collectors for heating water, electrical appliances with very low energy consumption and a central building automation system, to reduce the building’s total energy demand of to a minimum.

Raising the bar: Zero Energy

Minimizing heat loss and internal energy demand are essential first steps towards creating a building with a reduced carbon footprint. Yet developments within sustainable architecture are increasingly directed at forms of additional energy *production* which exceed the needs of the building itself. The use of solar, wind, hydroelectric or other local renewable energy sources to generate electricity can create a surplus which is fed back into the national grid.

With the installation of a small-scale wind generator and photovoltaic (solar cell) panels, LIPA Environmental Project will make use of the favourable sun and wind conditions which exist on Linesøya. The combination of a restoration to passive house standards with comprehensive on-site electricity production is a pioneering step in Scandinavian terms. Like the Hat Method, application of this technology to create a zero energy building has considerable symbolic value and potential for commercial development. This stage of the project will be developed in co-operation with one of Norway's largest power companies.

Throughout this process, LIPA Environmental Project makes an holistic approach its environmental profile and actions, a matter of priority. Among other aspects, this involves the consideration of embodied energy, choice of methods, transport or other logistical issues, as well as the life cycle of the materials and components used in the restoration process.

Universal Design and accessibility

Behind LIPA Environmental Project and Bjørk Environmental Center lies the conviction that a broad range of elements are necessary to create truly sustainable society. This implies that technological development must be combined with a change in attitudes, leading to a broader understanding of what "environment" means. The interdisciplinary nature of the project, the center's activities and the target audience reflect this, as does the incorporation of Universal Design into the project's architectural program. Through co-operation with the Norwegian State Housing Bank, LIPA Environmental Project will create a building with accessible, inclusive and user-friendly facilities for all visitors, regardless of age or physical mobility.

Design is used consciously as a tool in the creation of functional, modern and aesthetic solutions. A fresh visual approach is used throughout, in areas ranging from building work to marketing and dissemination activities. In this way, LIPA Environmental Project hopes make serious environmental ideas and actions attractive and accessible to a broader public.