

The VELUX logo is positioned in the top right corner of the image. It consists of the word "VELUX" in a bold, white, sans-serif font, with a registered trademark symbol (®) to its upper right. The text is set against a solid red rectangular background.

MORE COMFORT FOR LESS MONEY

Healthy Home Townhouses in Stjørdal, Norway





COZY HIGH-TECH

"The unique feature of these townhouses is a range of exclusive details and Active House standards that come at a square-metre price similar to that of a traditional newbuild townhouse in the same area."

real estate agent Torstein Nordby of Stjørdal

Located in the Stjørdal Active House residential complex outside the Norwegian city of Trondheim, the six townhouses form two rows of terraced houses, surrounded by nature. Wood - one of the main materials used in those houses, used as a building material in Norway for centuries - was sourced locally.

Each townhouse has a floor area of 138 square metres distributed between two floors on a narrow, deep plot. While the depth enables an economical layout and energy savings, roof windows are crucial for ensuring enough light and a healthy indoor climate.

Equipped with Velux Integra Active climate control system and hybrid ventilation, the house responds by itself to changing weather conditions, always guaranteeing highest comfort in terms of daylight, air quality and temperature.



The Healthy Home Townhouses are located in Hjelseng in Stjørdal, Norway. In the wintertime the sun goes up at 9.30 am to disappear below the horizon only five hours later. This makes providing plenty of daylight one of the biggest topics when designing housing in this region.

Thanks to the vicinity of the sea, the temperatures are rather mild, but low: the average temperature is below 10 degrees Celsius for more than half of the year.



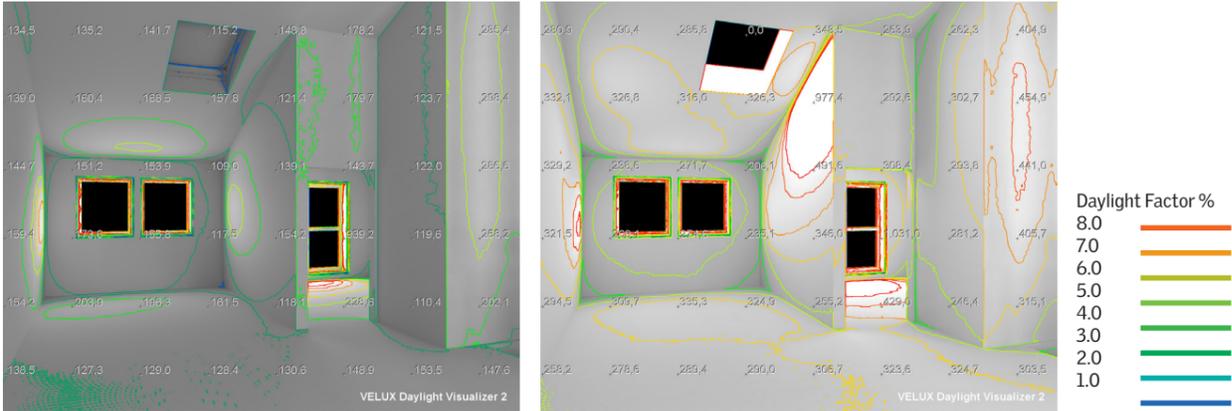


FULL OF LIGHT FROM TOP TO BOTTOM

With three bedrooms, a convenient laundry room and a spacious terrace, each unit has a range of facilities for families of different sizes and lifestyles. The focal point of the house is the large kitchen-dining room on the upper floor. Here, roof windows provide daylight from above and facade windows ensure a great view to the Trondheim fjord. Also in the ground floor living room, residents can enjoy sunlight from above. Thanks to a sun tunnel in the ceiling, natural daylight is led into the room, thereby reducing the need for electrical lighting.

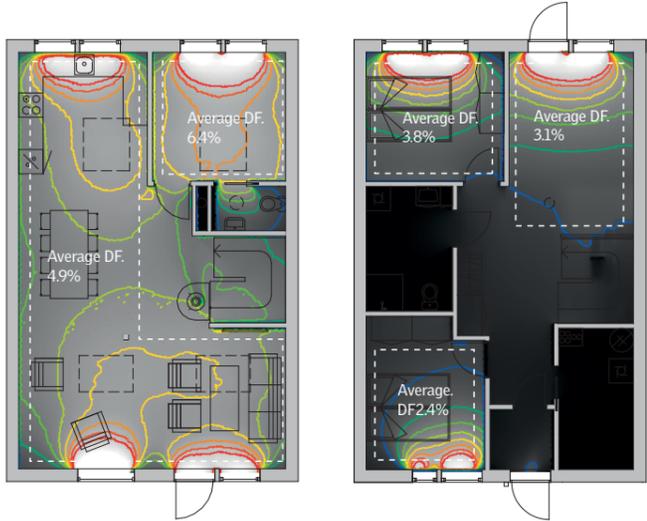
VELUX Daylight Visualizer 2 design tool was used in the design process to measure and ensure optimal daylight conditions. Illuminance renderings were prepared to measure the daylight factor - a recognized performance indicator to evaluate the amount of available daylight in the room.

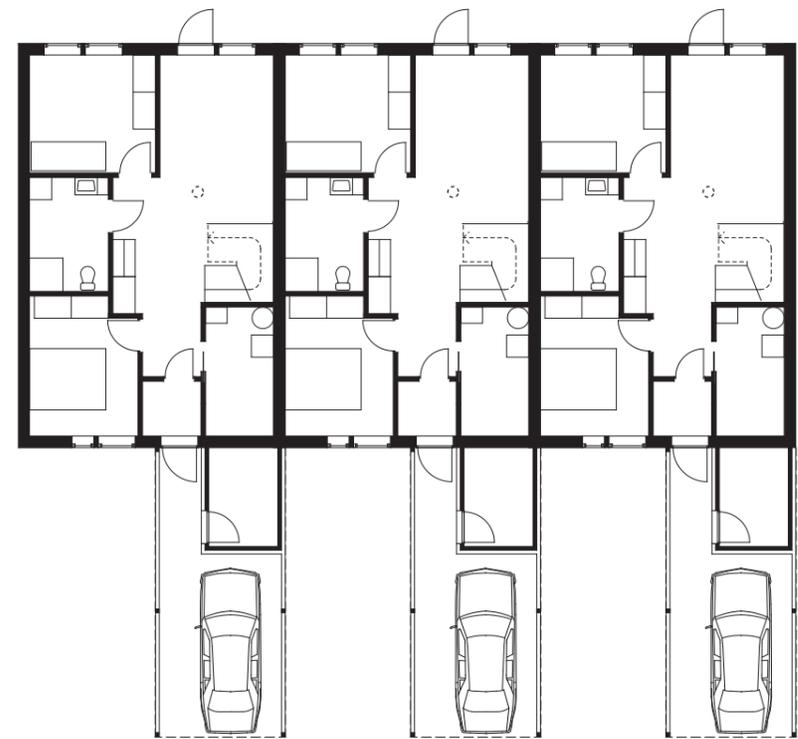
Thanks to collaboration with Velux, a light design tool was used from the concept design phase, which enabled adjusting floorplans to let some of the light from the high-positioned roof windows to reach the ground floor through an open staircase.



Illuminance renderings were prepared to compare the situation with and without roof windows on the indoor illumination levels. The figures on the renderings above show the differences in illuminance - the amount of light received on the surface - measurement in the kitchen with and without a roof window. The roof windows not only supply the room with twice as high light levels but also provide more equally distributed light at eye level and floor level.

The plans visualize clearly the enormous difference in the amount of daylight between the first and the ground floor, confirming the idea to place the day area upstairs.





The two bedrooms and the multifunctional area on the ground floor have generous wall openings. The deep multifunctional area reaches until the staircase and is additionally lightened up by a sun tunnel. This VELUX product uses a highly reflective tube to pass daylight into the depth of the volume.

The living area, where the families meet and spend time, is located on the first floor, to provide maximum hours of daylight. Full of daylight, thanks to roof windows on both sides of the sloped roof, features kitchen, dining area and sofa corner in one generous open space. White walls and light-coloured wooden floor contribute to the spacious, airy character of the room.



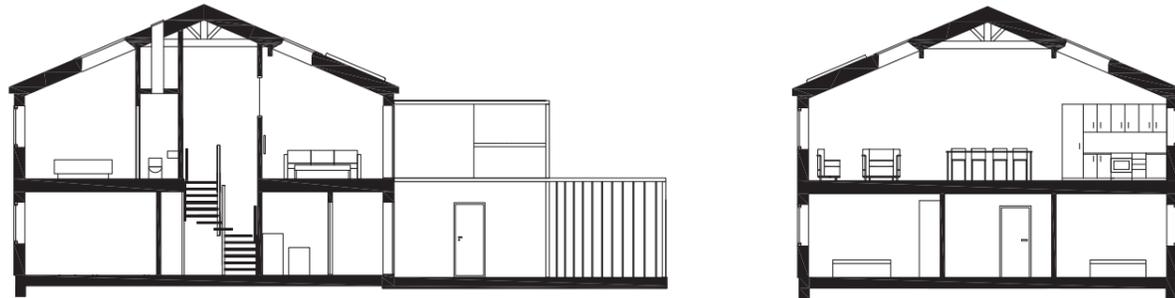
HOME AUTOMATION AND ENERGY SAVINGS

The control pad, steering the windows and heating, provides best living conditions: fresh air with minimum of energy loss, security as well as optimal daylight and humidity.

The Healthy Home Townhouses have a hybrid ventilation solution that provides excellent indoor air quality throughout the year. Fresh air is supplied by natural ventilation through the VELUX INTEGRA® roof windows. The roof windows can be programmed to perform automatic, natural ventilation when needed, operated with remote control. The natural ventilation is combined with a balanced mechanical ventilation system with heat recovery, which saves both energy and money.

In Healthy Home Townhouses mechanical ventilation is used in the heating period and natural ventilation for the rest of the year. External and internal solar shading allows to avoid overheating in the summer, while floor heating and a wood-burning stove supply an environment-friendly heating source.

The principle provides an efficient and ecological energy performance for new-build houses and works well with VELUX INTEGRA® roof windows.



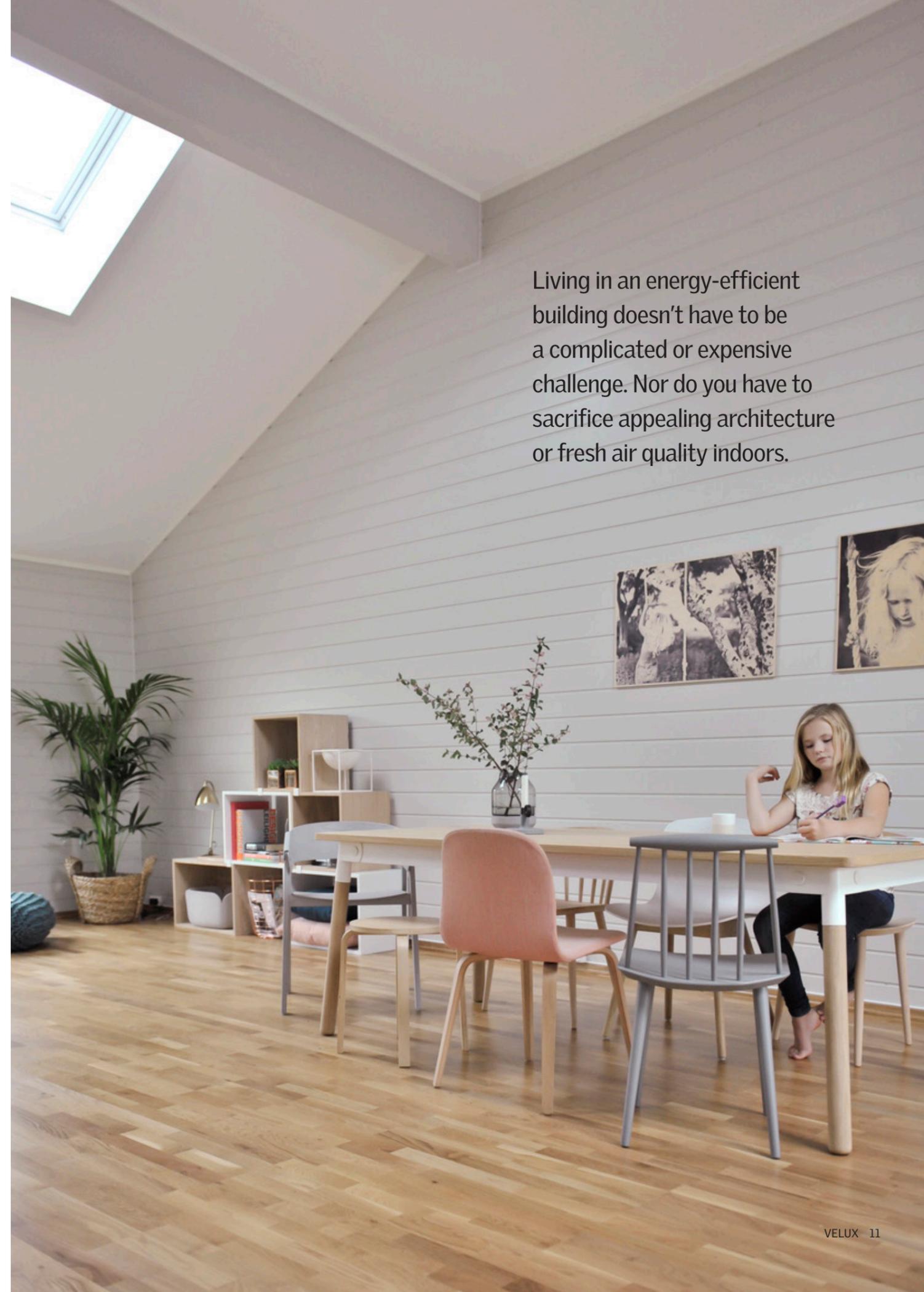
The sections show the first floor with large roof openings and the sun tunnel in the toilet. The location of the windows, together with the open staircase, allows for an efficient air circulation.

Active Houses focus on the fact that the most sustainable energy source is the energy we do not use. So the main focus in the design phase of the Healthy Home Townhouses was to reduce the energy demand by choosing the right shape and orientation of the house and active use of daylighting to reduce need for energy for electricity. All the areas that don't need to be heated - like a garage - were removed from the compact volume and set outside.

Healthy Home Townhouses have several heating sources. Floors are equipped with additional insulation and, in the bathroom floor, electrical heating cables. Domestic water is heated by solar collectors on the roof, while primary room heating is provided by electric radiators and a very well-proven technology: wood stoves. They provide pleasant and efficient heating on cold days, and sustainably sourced wood is carbon neutral.

Annual energy consumption is estimated to be around 51 kWh/m² per year. For comparison, an average terraced house in Norway consumes approximately 140 kWh/m² per year.

Living in an energy-efficient building doesn't have to be a complicated or expensive challenge. Nor do you have to sacrifice appealing architecture or fresh air quality indoors.





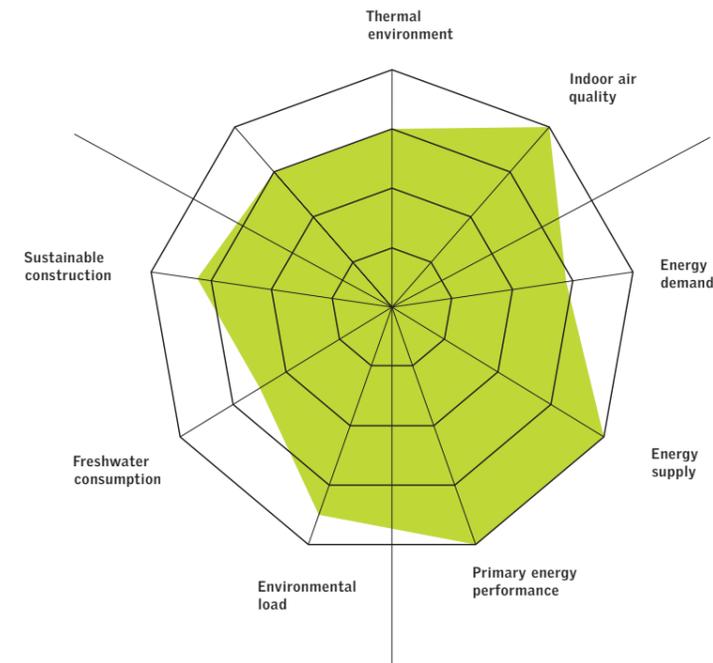
ACHIEVED QUALITY MEASURED BY THE ACTIVE HOUSE RADAR TOOL

Active House is an initiative supported by the Velux group, focusing on designing and measuring of optimal indoor climate, energy use and impact on the environment as the three criteria of future-oriented housing.

The Active House Radar shows at a glance to what extent the criteria have been met. This figure also shows how the parameters within the individual criteria are interconnected. Healthy Home Townhouses achieved the best score in indoor air quality, energy supply and primary energy performance, combining maximal comfort with maximal savings.

The evaluation wheel is divided into three main categories: indoor climate comfort, environment and energy. An ideal active house fulfills the following principles:

- has an indoor climate that promotes health, comfort and sense of well-being
- ensures good indoor air quality, adequate thermal climate and appropriate visual and acoustical comfort
- has an indoor climate that is easy for occupants to control and at the same time encourages responsible environmental behaviour
- is energy efficient and easy to operate
- substantially exceeds the statutory minimum in terms of energy efficiency
- exploits a variety of energy sources integrated in the overall design
- exerts the minimum impact on environmental and cultural resources
- avoids ecological damage and seeks to add to local biodiversity
- is constructed of materials with high recycled content and that allows for its own recycling or re-use.



INDOOR COMFORT

- optimal daylight conditions
- good air quality with low CO2 concentration all year round, thanks to the hybrid ventilation solution
- INTEGRA system sunscreens together with automated ventilation prevents overheating in the summer, keeping room temperatures below 26 degrees for 97% of the time

ENVIRONMENTAL IMPACT

- thanks to the lightweight construction made of local wood, more than 23% of the building can be recycled at the end of its life span
- a detailed life cycle analysis certifies the building's outstanding environmental balance

ENERGY USE

- total energy demand is with 51kWh/m2 per year 63% less than the average detached house in Norway
- 100% of energy comes from hydropower sources and thermal collectors
- mechanical ventilation with heat exchanger minimizes energy loss

PROJECT DATA

Year: 2014
Location: Norway
Address: Hjelseng, Stjørdal
Architect: Ketill Skogholt
Developer: Tore Ligaard A/S
Engineer: Grontmij
Photos: Anniken Zahl Furunes















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