



ZAGORODNY PROEKT

The First Active House in Russia



The First Active House in Russia

Polygon Lab Architects

The First Active House in Russia is designed to set a new standard for residential house construction in Russia. The house design is based on the Active House principles; balance between energy savings, healthy indoor climate and care for the environment, all adding to the architectural quality and well-being of the residents.

The project is organised and developed by one of the leading developers in the Moscow region, Zagorodny Proekt, in cooperation with the VELUX Group.

The VELUX Group is working hard today on the solutions of tomorrow by promoting architecture that enhances our quality of life and the sustainable development of society.

The First Active House in Russia was designed by the Russian architectural office Polygon Lab.

The project unites partners interested in a balanced and holistic approach to building design and performance.

The project is supported by the Russian Union of Architects, the Active House Alliance, Russian Sustainable Building Council, Eco Standard Group, Passive House Institute Russia, Wooden House

Association, Construction Physics Scientific and Research Institute and the Russian State Construction University in St. Petersburg.

The house is situated on the outskirts of Moscow in Zapadnaya Dolina, a new residential community now under construction. There are already plans to build more houses based on the active house principles in Zapadnaya Dolina.



His Royal Highness, the Crown Prince of Denmark opened the First Active House in Russia during his state visit to Russia.



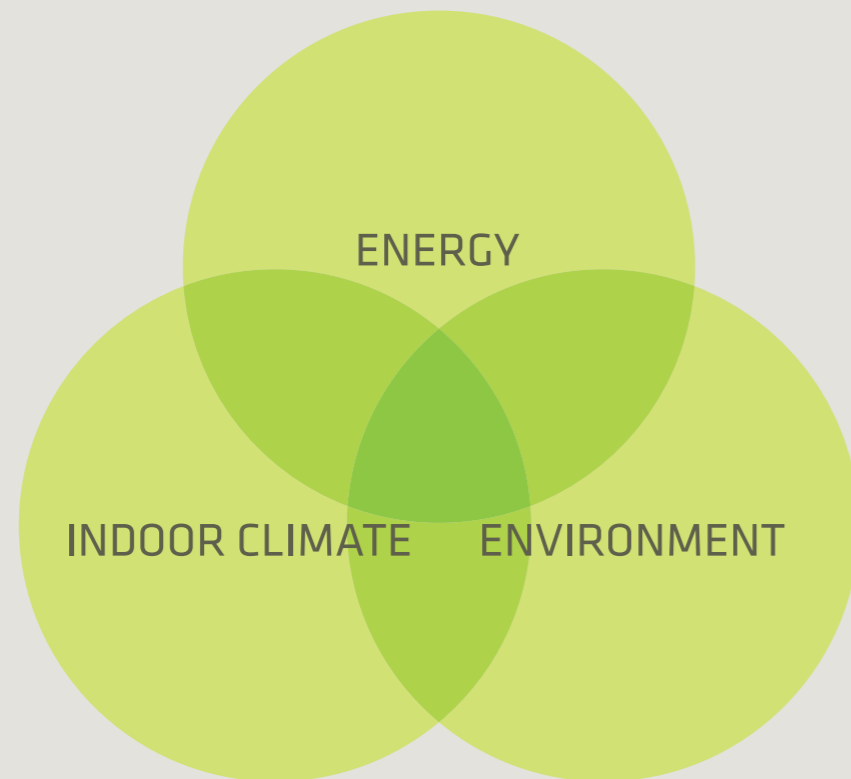
Vision

Active House is a vision of buildings that create healthier and more comfortable lives for their occupants without impacting negatively on the climate – moving us towards a cleaner, healthier and safer world.

The Active House vision defines highly ambitious long-term goals for the future building stock. The purpose of the vision is to unite interested parties based on a balanced and holistic approach to building design and performance, and to facilitate cooperation on building projects, product

development, research initiatives and performance targets that can move us further towards the vision.

Active House proposes a target framework for how to design and renovate buildings that contribute positively to human health and well-being by focusing on the indoor and outdoor environment and the use of renewable energy. An Active House is evaluated on the basis of the interaction between energy consumption, indoor climate conditions and impact on the external environment.



Key principles of Active House

An important aspect of the Active House concept is that of 'integration'. Although energy, indoor climate and environment are essential components of the vision, it is the way their integration promotes architectural quality, human health, comfort and well-being which represents the value of the building.



Energy

- A building which is energy efficient and easy to operate
- A building which substantially exceeds the statutory minimum in terms of energy efficiency
- A building which exploits a variety of energy sources integrated in the overall design



Indoor climate

- An indoor climate that promotes health, comfort and sense of well-being
- A building which ensures good indoor air quality, adequate thermal climate and appropriate visual and acoustical comfort
- An indoor climate which is easy for occupants to control and at the same time encourages responsible environmental behaviour



Environment

- A building which exerts the minimum impact on environmental and cultural resources
- A building which avoids ecological damage and seeks to add to local biodiversity
- A building which is constructed of materials which have high recycled content and which provides the ability for its own recycling or re-use

Integration of the three main principles of energy, indoor climate and environment

- A building which integrates the demands of comfort, climate, energy, environment and ecology into an attractive whole
- A building where such integration adds to architectural quality and human well-being
- A building whose interactive systems and spaces add to human enjoyment and support environmentally responsive family life

Active House is an initiative supported by the VELUX Group



Architecture

The proportions and dimensions of the house have the appeal of a modern twist to traditional architecture. The architectural experience of the house is about the relationship between inside and outside, the interplay between geometry and light. Moving from one room to another gives a unique experience of a picture frame view to the environment and a clear view to the sky through the strategically placed VELUX roof windows.

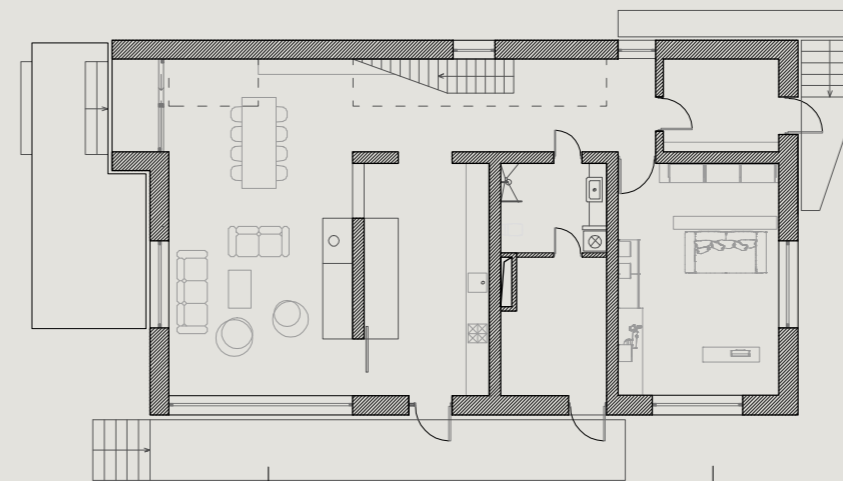
The collaboration between the architects and consulting engineers using the most eco-friendly products and solutions available on the market represents the holistic approach to the project.

The house has the appearance of a solid volume with extensions, which relate to different functions in the house; a porch, mezzanine and chimney. The house is oriented east-west with a south-facing offset slope.

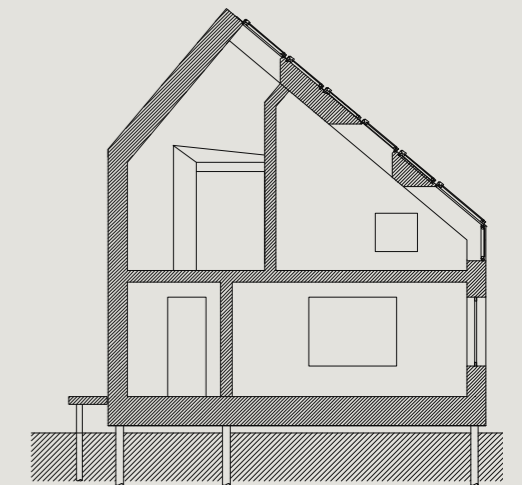
In the house design, traditional solutions are presented in a modern interpretation. The layout of the house is functional and yet unique. The regular floor plans meet the sloping roof with double high spaces.

The house is divided into two floors. On the ground floor there are communal areas with kitchen, living room and office space. The private living spaces are on the second floor with a master bedroom and two smaller bedrooms.

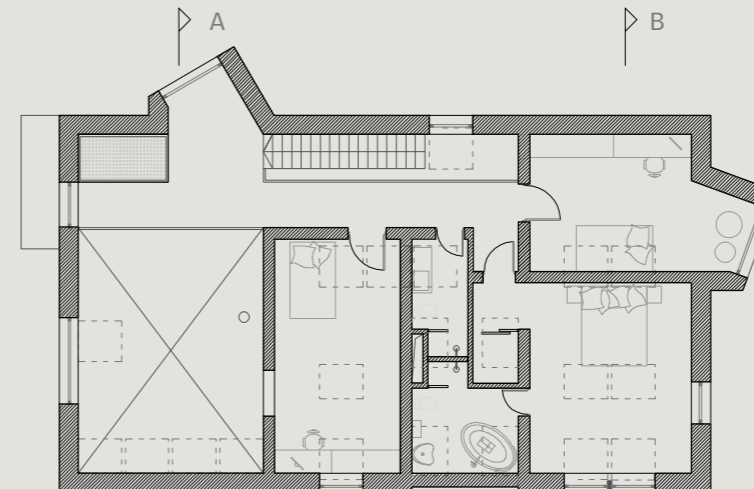
The living room with a visual connection between the two levels celebrates the generous amount of daylight. The facade windows are strategically placed to frame the attractive view of the hilly landscape and woods surrounding the house. The roof windows allow light to penetrate deep into the rooms.



Ground floor 1:200



Section B-B 1:200



Second floor 1:200

Ground floor	134 m ²
Second floor	95 m ²
Total	229 m ²
Terrace area	47 m ²

Active Facade

Harvesting free energy from the sun

The south facade and sloping roof play an important role in intelligent daylight design. Strategically placed roof and facade windows and integrated VELUX solar collectors utilise the free energy from the sun.

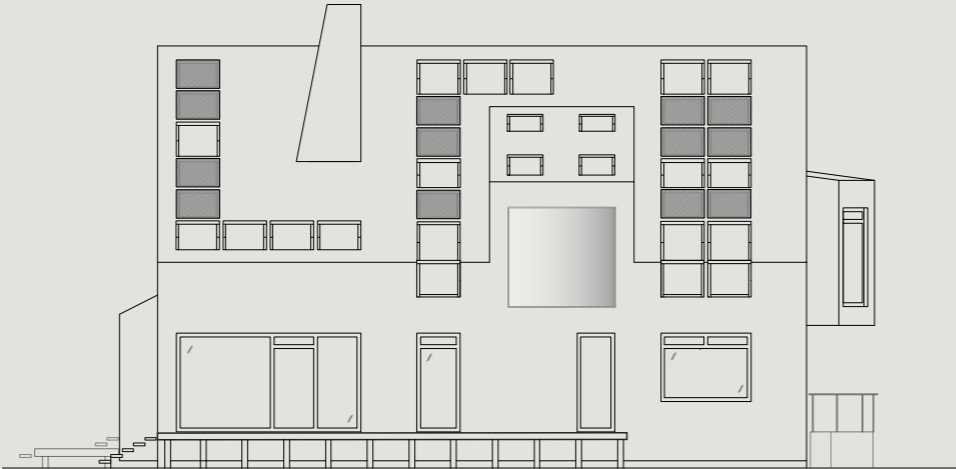
The facade has active features, which are vital for creating the pleasant indoor climate in the house. It benefits from free solar heat gain and the stack effect to create a pleasant natural ventilation. The facade changes with automatic sunshading products on the roof and facade windows depending on temperature, direction of the sun and the needs of the residents.

The homogenous material on the roof and facade is a reference to traditional Russian building methods. This solution is ecological; the wood facade is durable and has a low CO₂ impact.

The wooden framework construction was chosen because it helps to ensure energy savings as multiple layers of wall construction will minimise cold bridges. To create thermal mass, special heavy gypsum is used for the interior walls.



East facade 1:200



South facade 1:200



West facade 1:200



North facade 1:200

Indoor climate

An Active House creates healthier and more comfortable indoor conditions for the occupants and the building ensures a generous supply of daylight and fresh air. Materials used have a positive impact on comfort and indoor climate.



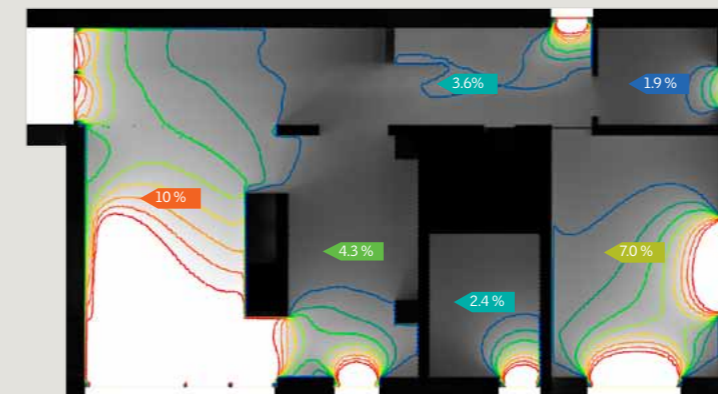
The First Active House in Russia offers a healthy and comfortable indoor climate with daylight and fresh air. The architects worked with variations of daylight in the different spaces and on ensuring attractive views of the surroundings with strategically placed windows. Through collaboration with the consulting engineers the design was optimised based on indoor climate tests performed in 3D simulations. In the project group the Active House principles created a platform where cooperation between architects, engineers and energy specialists became part of the creative design process.

Thermal comfort in the warm summer months is achieved with natural ventilation; cross-ventilation and stack effect to maximise the ventilation rate. In order to provide a comfortable indoor climate all roof and facade windows are fitted with interior and exterior blinds and awnings. Glare and overheating during the summer are reduced with automatically controlled awning blinds.

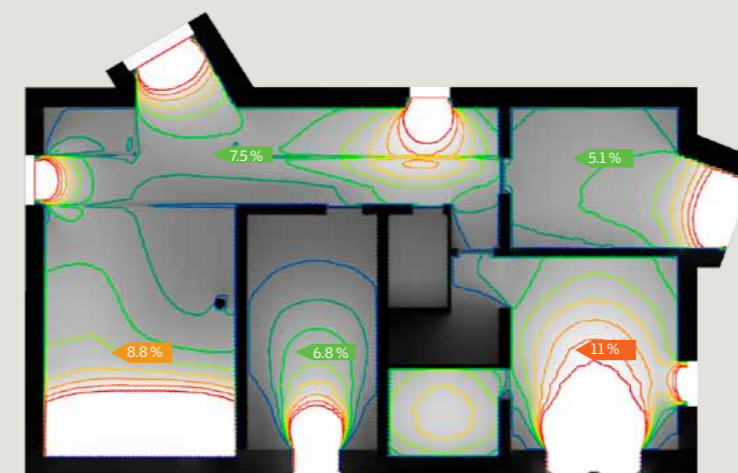
A comfortable indoor climate with natural ventilation is secured with the advanced home automation system by WindowMaster. The system can automatically open and close windows based on the CO₂ levels in the house. The VELUX INTEGRA electrical roof windows, facade windows and all sunscreening products are integrated into this unique system. The WindowMaster system has a user-friendly and simple interface so it is easy to see the status of the products and operate them. The system used in the house is adaptable to the personal preferences of the residents.



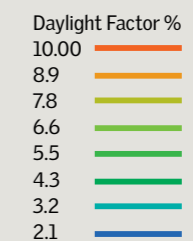
Daylight factor



Ground floor 1:200



Second floor 1:200



The daylight performance of the house has been specified using the daylight factor (DF) as performance indicator. The results of the daylight analysis show that all rooms that are used actively during the light hours have a daylight factor above 5%. The roof windows deliver high levels of daylight in the centre part of the room. High levels of daylight in the home are proved to have potential for health benefits and increased alertness and safety.

Simulations were made by the VELUX Daylight Visualizer 2, a software tool dedicated to daylighting design and analysis. For more details and download, visit <http://viz.velux.com>

The daylight factor is a common and easy-to-use parameter for the available amount of daylight in a room. It expresses the percentage of daylight available inside, on a work surface, compared to the amount of daylight available outside the building under known overcast sky conditions. The higher the DF, the more daylight is available in the room. Rooms with an average DF of 2% or more are considered adequately daylight. A room will appear strongly daylight when the average DF is above 5%.

Energy

An Active House is energy efficient and the majority of energy needed is supplied by renewable energy sources integrated in the building or from the nearby collective energy system.



The First Active House in Russia is energy efficient and easy to operate. To reduce CO₂ emissions and optimise energy performance, the building must be considered as a whole, not just the sum of its components.

The house exploits a variety of energy sources that are integrated in the overall design. Free energy from the sun is the primary energy source of the house. The features contributing towards a positive energy balance include a highly effective heat pump, thermal solar collectors for production of hot water and a PV solar cell system to generate electricity.

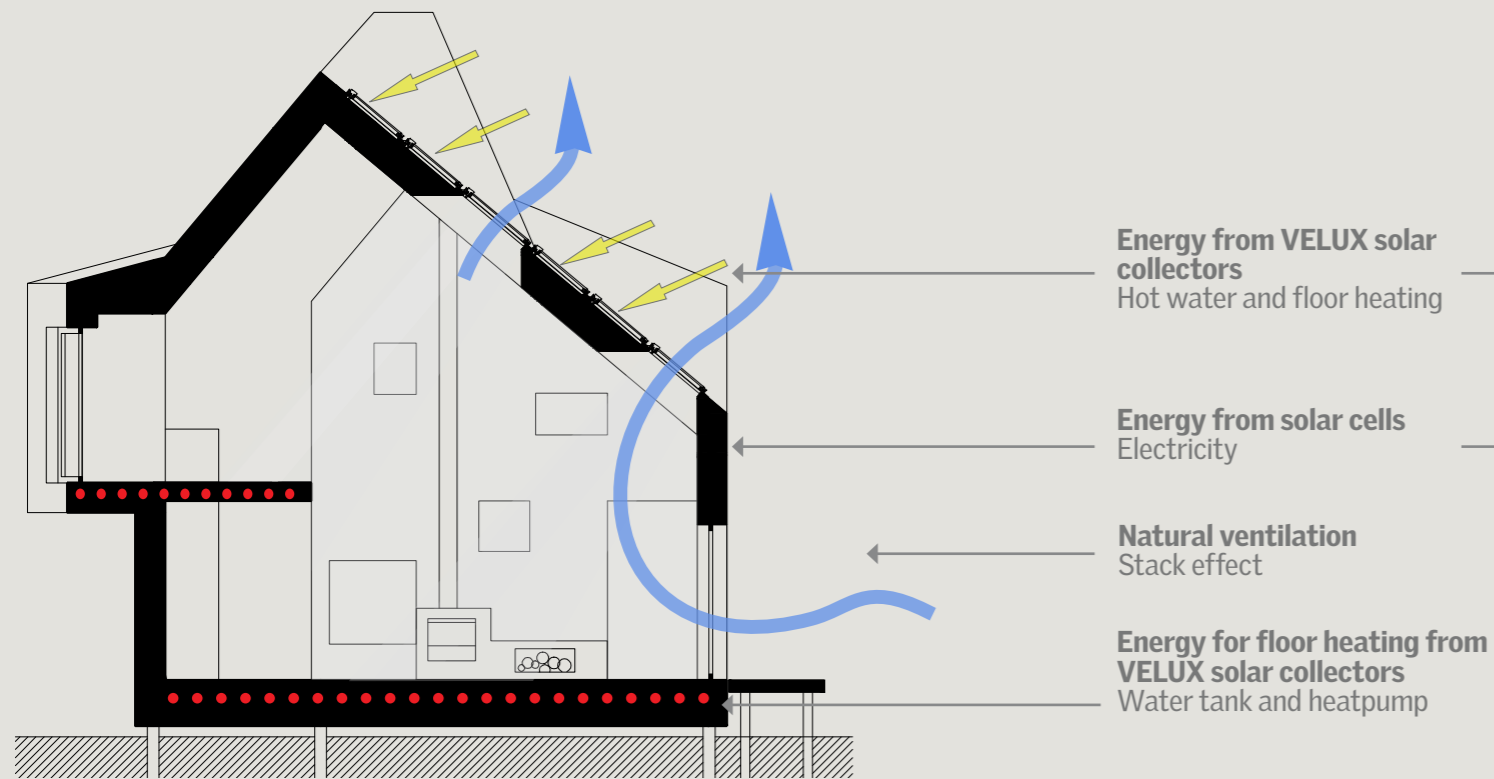
VELUX solar thermal collectors designed for installation in combination with roof

windows exploit the heat of the sun while providing a visually appealing and technically optimal solution. VELUX solar collectors can generally provide up to 65% of the energy required to produce domestic hot water. The sun is the most powerful source of energy we have and we should make maximum use of it.

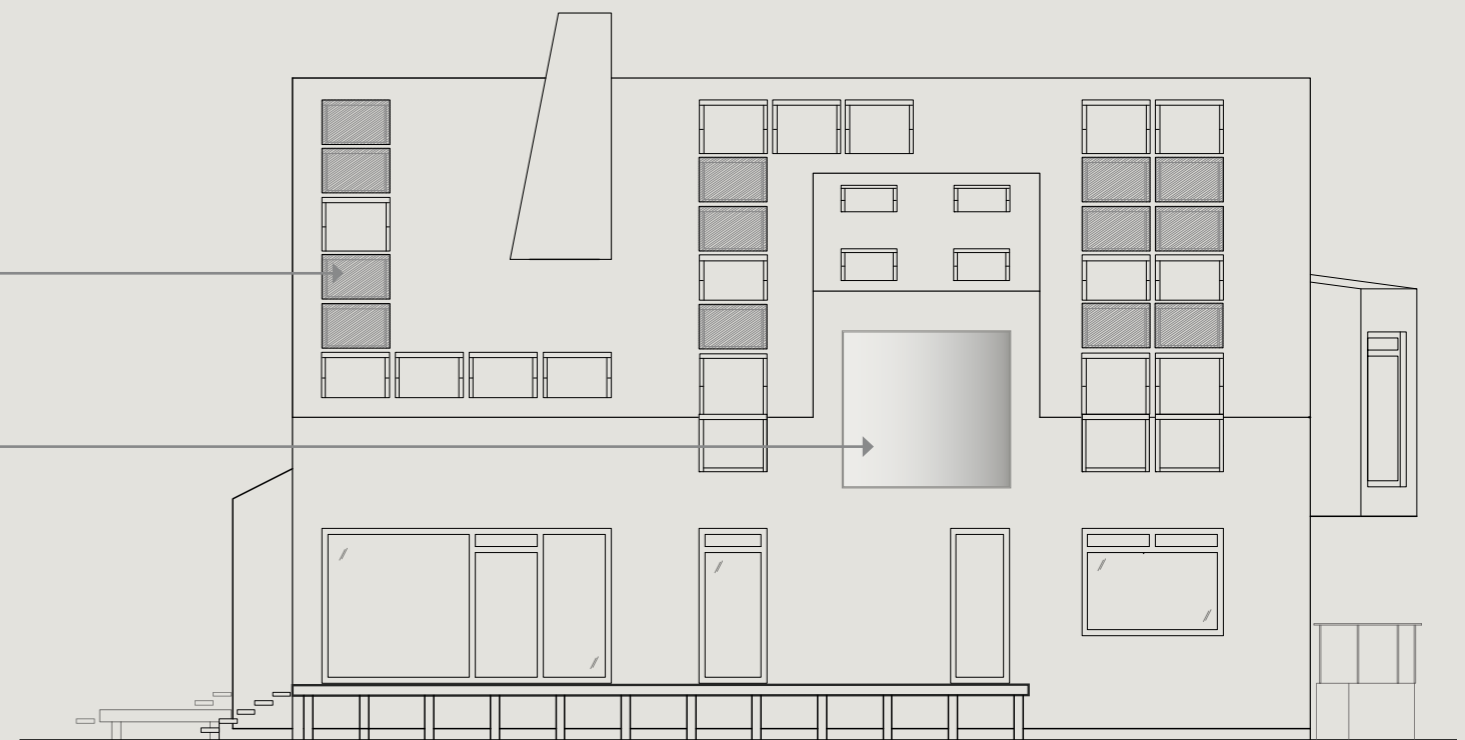
The orientation and design of the house make it possible to utilise daylight more actively. The windows should be considered as energy contributors. They are placed strategically to allow for solar heat gain and optimum natural ventilation. The energy requirement for basic lighting in large parts of the house is minimised by effective use of daylight.

A tightly-sealed construction is vital for achieving low energy consumption. The walls are highly insulated with multiple layers. Special highly compressed gypsum is added on the inside of the walls to add thermal mass to the light timber frame construction.

The results of an energy calculation performed by the Passive House Institute in Russia show that the specific consumption of energy for heating during the heating period is 38 kWh/m²/year. Total consumption of primary energy is 110 kWh/m²/year.



Section A



South facade

Environment

An Active House interacts positively with the environment by means of an optimised relationship with the local context, focused use of resources, and its overall environmental impact throughout its life cycle.

Certified wood

The NLK House building company is responsible for the wooden house construction of The First Active House in Russia. The company is a recognised leader in manufacturing of products from deep wood processing in Russia.

The NLK House building company has received a certificate from the Forest Stewardship Council. The FSC label means that the product is made of wood that has been felled without causing harm to the environment, animals and birds that inhabit the forest and the people living and working in the adjoining forest areas.

VELUX roof windows have a long life span - up to forty years. Most of the timber used in making them comes from sustainable PEFC- or FSC-certified forestry. The glass and aluminium used in the windows can be recycled.

New Russian Green Building Standard

The vision of this new standard is to help shaping public opinion about sustainable habitats and to create a rating system for certification of "green" buildings and settlements to change the regulatory framework and legislation in the field of construction and architecture. The aim of the project is to become the first project certified by the Russian Green Standard.

The Russian national rating system for certification of green building is based on European standards as a tool for the formation of "green" architecture. The standard supports the establishment of a certification system for building materials and technologies.

Sustainable development of architecture will be the main objective of the Council to shape public opinion about caring for the environment and obtaining a healthy and comfortable lifestyle.

The project is adapted to the specific climatic conditions of Moscow, a humid continental climate with warm summers and long, cold winters.

The building exerts minimum impact on the environmental and cultural resources. It is constructed of materials with a high recycled content and which provide the ability for own recycling or re-use.

The homogenous material on the roof and facade is a reference to traditional Russian building methods. This solution is also eco-

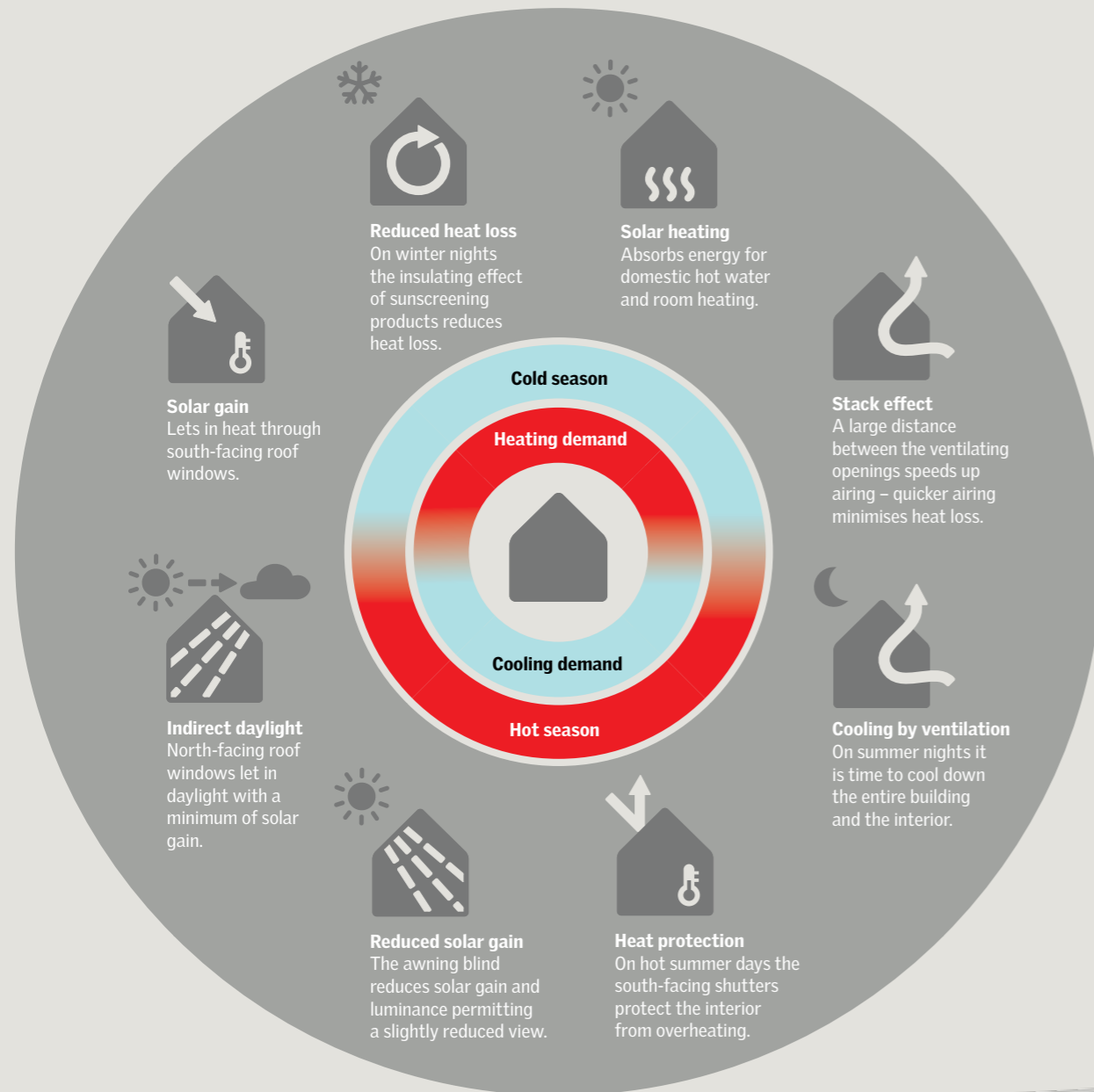
logical; the wooden facade is durable and has a low CO₂ impact. Pile foundation is used as basis for the construction of the house. The framework of softwood pine is assembled on site.

To learn more about how the building will perform under real life conditions, data will be collected for reviewing and reporting the performance of the house. The monitoring will help determine the effectiveness of the architectural and technological solutions.

The house will be open for the public for six months after completion, followed by a 12-month period with a test family.



PEFC certified
VELUX wooden roof windows are from sustainably managed forest and controlled sources
www.pefc.org

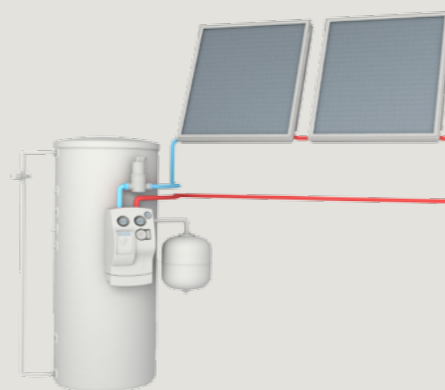


VELUX solar collectors, thermal solar energy

The sun provides incredible amounts of energy. As hard as we try, we will never be able to consume it all.

The VELUX thermal solar energy systems for domestic hot water and room heating are designed to maximise efficiency, aesthetics and convenience.

Their installation is of the same renowned high quality as all VELUX installations. The result is aesthetically pleasing and they are easily combined with VELUX roof windows.



Living in daylight

Generous amounts of daylight create a light and pleasant atmosphere in the house. The orientation and design of the house make it possible to utilise daylight more actively. The energy requirement for basic lighting in large parts of the house is minimised by effective use of daylight.

Energy balance

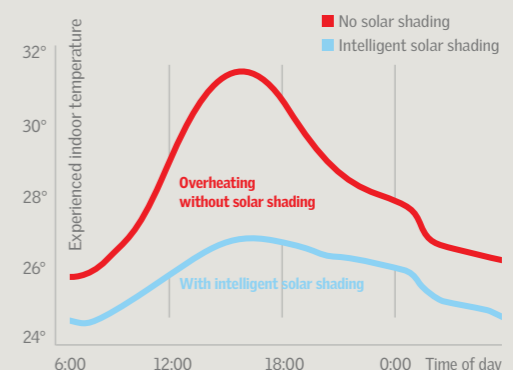
Heat loss (U-value) + **Solar gain (g-value)** = **Energy balance (Eref)**

To measure the energy balance in a building using the advantages of daylight and energy from the sun, it is important to calculate the total energy framework. This means not only looking at how much heat is lost through the windows, but also including the windows' contribution to the heating of the house in winter.

The term energy balance is used to describe the energy characteristics of a window, the balance between solar gain and heat loss. The energy balance is calculated as the sum of usable solar gain through the window during the heating season minus any heat loss. Energy balance is a more accurate way of describing the energy characteristics of a window than just the U-value, as the energy balance includes both U-value and g-value to provide a more complete picture.

Intelligent solar shading

In order to provide a comfortable indoor climate, all roof windows are fitted with interior and exterior blinds and awnings. The house has an advanced home automation system by WindowMaster. The system can automatically control the indoor climate in the house, based on CO₂ levels. VELUX INTEGRA electrical roof windows, facade windows and all suncreening products are integrated into this unique system.





ZAGORODNY PROEKT

About the development company

Zagorodny Proekt is one of the leading development companies in the Moscow region. Founded in 2008, Zagorodny Proekt offers innovative solutions in all sectors of the real estate market combining large-scale initiatives with flexibility and attention to detail. The projects are characterised by a distinguished architecture, original design and state-of-the-art technologies. The projects are managed by a highly professional staff with considerable ex-

perience in community masterplanning, mixed-use projects and industrial development.

Zagorodny Proekt's portfolio currently consists of eight projects: Zapadnaya Dolina mixed-use community, Novo-Molokovo residential neighbourhood, Yuzhniye Gorki, Yuzhniye Gorki-2, Klubnichniye Polia, Chernichniye Polia, Kamenka Natural Park and M4 Industrial Park.



Zapadnaya Dolina

Plot area:
82.7 ha

Location:
Moscow region,
Naro-Fominsk district,
20 km from MKAD reached
by Kievskoye highway

Area of construction:
218,700 m²

Commercial buildings:
13,700 m²

Residential buildings:
205,000 m²

Number of dwellers:
6,000

Master planning

Zapadnaya Dolina is a residential community targeted at homeowners who are seeking to escape the city and maximise the work-life balance. The First Active House in Russia is a pilot project, which demonstrates that with the right design and planning, building an energy-efficient house with a healthy indoor climate is possible with the technology and building materials already available on the Russian market today.

Zapadnaya Dolina will cater for an anticipated population of 6,000 people and will offer villas, townhouses and apartments along with retail, educational and community facilities all located in a highly attractive community that incorporates a wide variety of housing choices, highly attractive streetscapes and well-maintained open spaces.

Photos:
Projects by Zagorodny Proekt
in Zapadnaya Dolina.





VELUX products

The First Active House in Russia

The VELUX Group creates better living environments with daylight and fresh air through the roof. The VELUX product programme contains a wide range of roof windows and skylights, along with solutions for flat roofs. The Group also supplies many types of decoration and sun screening, roller shutters, installation products, products for remote control and thermal solar panels for installation in roofs. The VELUX Group, which has manufacturing companies in 11 countries and sales companies in just under 40 countries, represents one of the strongest brands in the global building materials sector and its products are sold in most parts of the world. The VELUX Group has about 10,000 employees and is owned by VKR Holding A/S, a limited company wholly owned by foundations and family. For more details, visit www.velux.com.



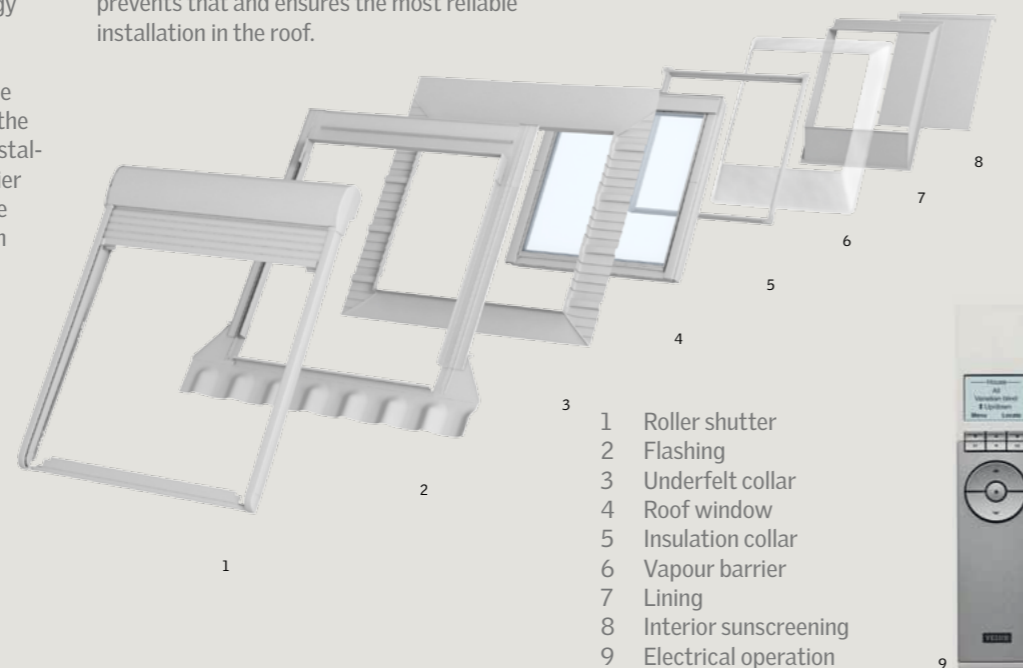
System solutions

VELUX installation products ensure that the VELUX roof window is connected to the roof in the most energy-efficient way. No matter how energy-efficient an individual building component is, it is never better than its fitting to the rest of the building. Over 60 years, the VELUX Group has developed a unique installation procedure that is well known throughout the industry. It ensures the best possible connection to the roof and eliminates unnecessary energy loss between roof and window.

The underlying principle is to install the window deep into the roof and to use the correct flashing, the BDX insulating installation frame and the BBX vapour barrier collar to ensure tight connection to the rest of the construction. The insulation

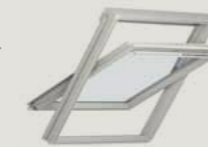
frame also ensures the highest installation quality and minimises unnecessary heat loss in the space between window and roof material.

To meet today's stringent demands for energy-efficient buildings, homes must be airtight. Any penetration of a building's climate shell could compromise those demands. The VELUX installation procedure prevents that and ensures the most reliable installation in the roof.



VELUX roof windows

Model GGL INTEGRA®. Pivot hung. Electrically operated roof window including remote control and rain sensor for automatic closing in case of rain.



Model VFE. Bottom vertical element for installation in the vertical roof directly below a VELUX roof window.



VELUX thermal solar collectors

VELUX solar collectors for hot water supply. Model CLI.



Sunscreening products

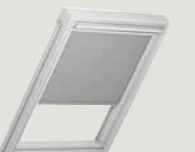
VELUX awning blinds offer effective heat protection because the rays of the sun are stopped before they reach the glass. The blind stops the heat, keeping the home cool and airy. Best of all, it does not block the view to the outside.



Exterior suncreening – electrically operated VELUX roller shutters. Model SML. Every VELUX roller shutter offers six protective functions in one, shutting out summer heat, saving energy in winter, protecting the window pane from damage, reducing noise, controlling light and ensuring safety and privacy.



Elegantly designed VELUX blinds for easy control of heat and light in the home. Adding VELUX blinds to roof windows can increase comfort and reduce heat loss by as much as 21% with the energy blind – lowering heating bills while enhancing comfort.





The First Active House in Russia

Developers:



ZAGORODNY PROEKT

Partners:



Sponsors:



Supporting Organisations:



VELUX A/S
Ådalsvej 99
DK-2970 Hørsholm
Tel. +45 45 16 40 00
www.velux.com

Bringing light to life™

VELUX®