



ZAGORODNY PROEKT

The First Active House in Russia



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Societies all over the world are facing the same challenges: to make the demands of modern life meet the need for protection of the environment; to find new ways in which we can ensure healthy and pleasant living. The buildings where we live and work can contribute to sustainable solutions. That is the idea behind the Active House principles, a set of requirements for integration of energy, indoor climate and environment.

The Active House principles can be implemented all over the world. But few places offer better opportunities than Russia. With growing affluence, people have become increasingly aware of the importance of good living conditions. The climate offers extreme shifts in temperature and a growing environmental concern highlights the need for energy-efficient solutions. The First Active House in Russia was built to show how a range of available energy solutions offers responses to all these challenges.

Developed in cooperation between the VELUX Group and Zagorodny Proekt, one of Russia's leading construction companies, the Active House has gone from idea to reality. Today, the building is both a showcase of energy-efficient technology and a modern home for a family of five.

The house is also an example of how eye-catching architecture, inspired by local traditions, can contribute to energy

efficiency and good living conditions. Designed by Russian architectural office Polygon Lab, the First Active House in Russia is the result of a process involving a range of partners interested in a balanced and holistic approach to building design and performance.

But the ambitions of the First Active House in Russia are not just about energy efficiency and beautiful architecture; the house is part of a broader vision of improving life quality. Located in Zapadnaya Dolina, a new residential community now under construction on the outskirts of Moscow, the Active House will be surrounded by other high quality homes. The developer is currently working on a business model for production of new houses based on the Active House principles.

The creation of a house where design, function and surroundings can serve as inspiration to the future has gained widespread support. Active House Rus-

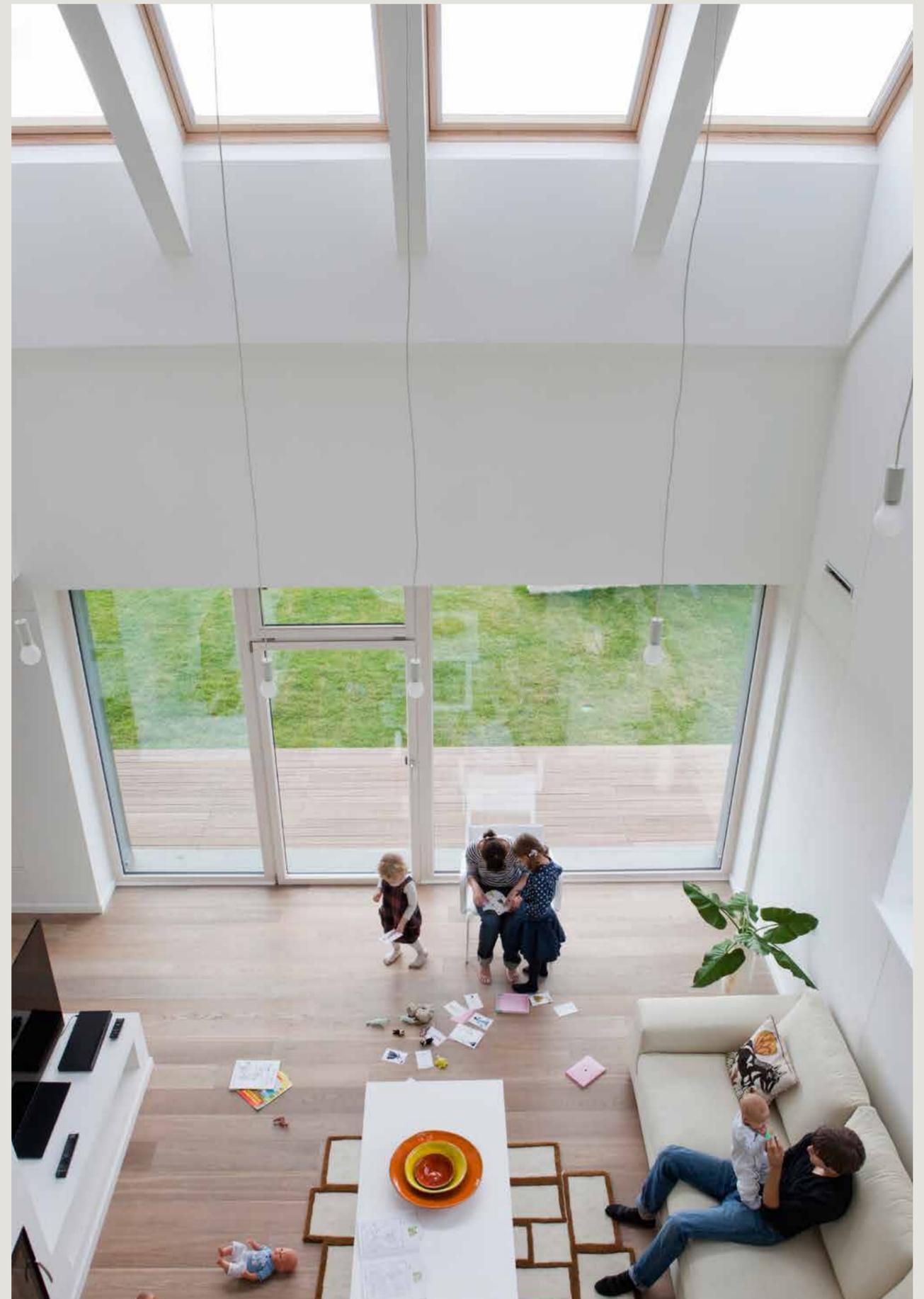
sia is supported by the Russian Union of Architects, the Active House Alliance, Russian Sustainable Building Council, Eco Standard Group, Passive House Institute Russia, Wooden House Association, Construction Physics Scientific and Research Institute and the Russian State Construction University in St. Petersburg.

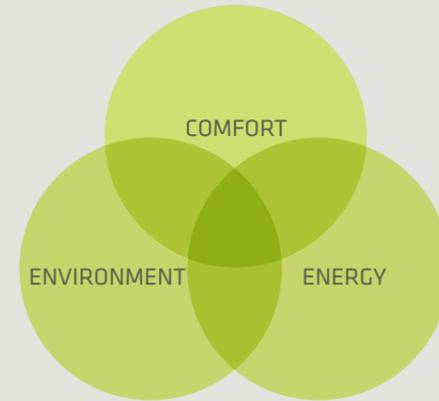
Thanks to their support, and to outstanding cooperation between everyone involved in the construction, the First Active House in Russia is now a reality. The building is ready to serve as inspiration to everyone with an interest in energy-efficient technology, appealing architecture and good living environment. Welcome to a house with great light and a bright future.

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



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





Active House – a holistic approach

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



Active House Label

The Active House label is a worldwide quality stamp for comfortable and sustainable buildings. It advises on elements that are important to humans life and living in their home. The Active House

label can be issued to buildings that has been evaluated in accordance with the Active House specifications and meet the minimum demands for indoor comfort, energy efficiency and environment.



The VELUX Group is one of the founding partners of the Active House Alliance, a global network of builders, researchers, designers, contractors and manufacturers.

The Alliance members partner up to realise buildings that create healthier and more comfortable lives for occupants with no negative impact on the climate.



Architecture

When architect Alexander Leonov and his colleagues in Polygon Lab began working on Russia's first Active House, they were entering new paths. Not only was the Active House concept completely new in Russia, but the architects had to overcome both aesthetical and technical challenges. "We wanted the house to be solid, we wanted to reduce sharp elements, and we had to take energy efficiency into account," explains Alexander Leonov.

Backed by consultancy from energy advisors and house company NLK, the architects collected information about Russian building traditions, energy technology and previous experience with wooden houses. The result is a building that captivates the spectator with its robust, yet warm and inviting, attitude. The inspiration came from modern Nordic wooden houses as well as traditional Russian housing.

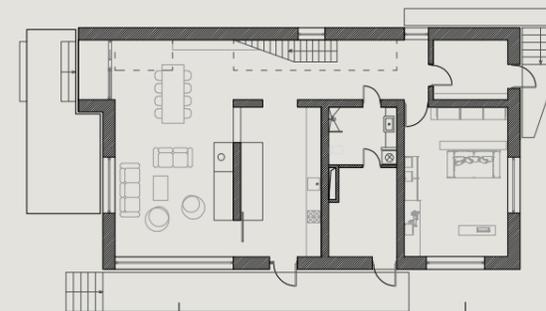
To many, Russian architecture brings associations of either lavish palaces or endless rows of concrete blocks. Polygon Lab wanted to show that modern Russian architecture can draw on different traditions and create buildings that offer both a beautiful exterior and good living environment.

"We were inspired by small wooden houses, dachas," Alexander Leonov explains. A dacha is a traditional summer residence or country house that is common through-

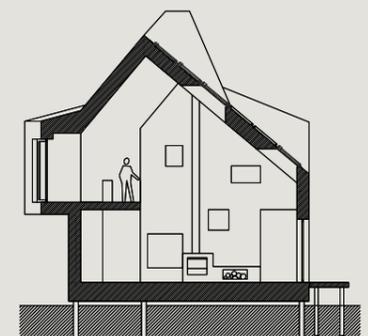
out Russia and Eastern Europe. Dachas usually have a simple, rectangular structure – a concept adopted by the Active House. Other examples of dacha-inspiration are the extended elements and the big chimney. It is not just for letting out smoke; in the Active House, the chimney also contains pipes and other installations. The combination of ancient inspiration and modern installations creates a house well suited for a contemporary family. On the inside, the house is divided into two floors. The ground floor consists of large communal areas such as kitchen, living room and office space. The size and flexibility of these rooms allow for many different activities, including a play area for children. Thanks to the open spaces, the parents can easily keep an eye on the children all the time. The private living spaces are on the first floor, with a master bedroom, bathrooms and two smaller bedrooms. Both floors are flooded with generous amounts of daylight. Walls and roof are

intersected by numerous windows, creating a building in which seasons, weather and the movements of the sun are always visible.

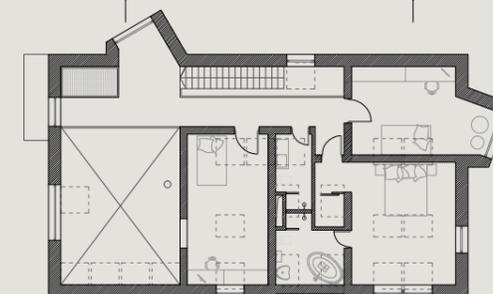
"There are many reasons why we wanted to provide the house with lots of daylight. One of them is the fact that good daylight reduces the need for electrical light," says Alexander Leonov. The preference for windows affected many aspects of the house. Large windows are heavy, so the house needed a solid structure to support them. Special attention was also paid to the sealing between roof, walls and windows in order to avoid leakage of air and water. The architects insisted that the Active House had windows on all four sides. In that way, the wind can always be used for natural ventilation, regardless of the wind direction. In addition, having windows on all four sides brings more solar gain to the house, and the huge influx of daylight improves the living environment.



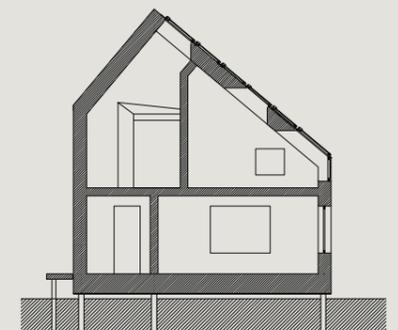
Ground floor



Section A-A



First floor



Section B-B

Active Facade

Making the most of 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 roof and facade of the First Active House in Russia give the house a distinctive look. But they do much more besides. Thanks to a combination of local expertise and new technology, roof and facade also contribute to the house's indoor climate and energy efficiency. They harvest free energy from the sun, let daylight and fresh air into the building and keep the cold out. The sloping roof of the First Active House in Russia consists of wood panels intersected by stripes of windows. They provide the house with generous amounts of daylight. Integrated VELUX solar collectors contribute to the heating of the house, while the automatic sun screening on roof and facade windows ensures a pleasant indoor temperature on sunny days. The windows also provide natural ventilation, thereby contributing to a healthy indoor climate.

In the cold season, the house can cope with the heaviest snowfall and large drop in temperature.

"The windows are designed in such a way that the snow doesn't stay there for long. The windows have a steep angle, and the stripe-structure makes the snow slide down. The surface of the windows also prevents snow and dust from sticking to the glass," explains architect Alexander Leonov.

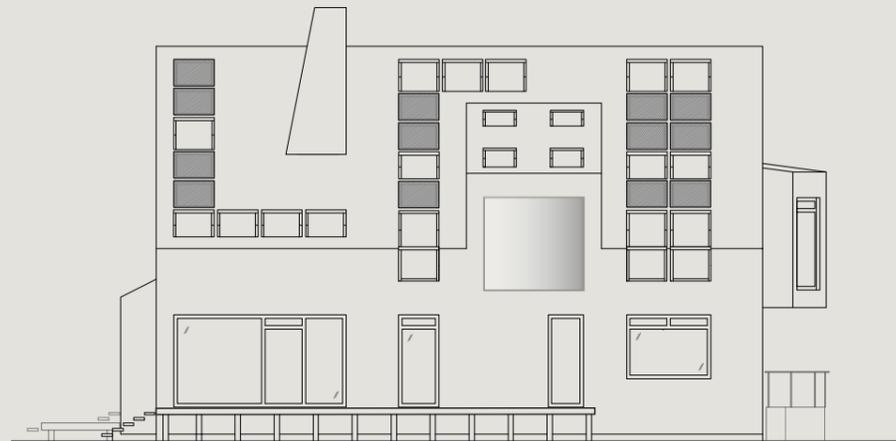
The facade's multiple layers of wood minimise cold bridges and the use of heavy plaster in the interior walls creates thermal mass in the building.

"We paid a lot of attention to the details, especially the sealing between roofs, wall and windows," explains Alexander Leonov. He is very happy with the result:

"The facts show we did a good job. When the temperature in Moscow was -30°C, the house was still warm inside."



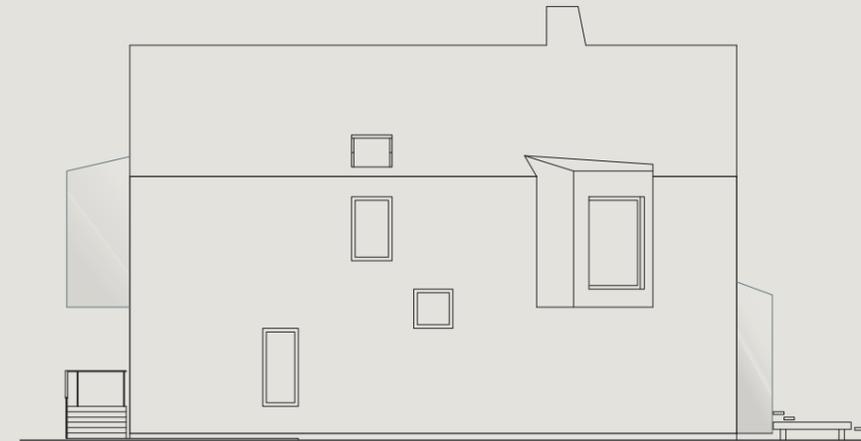
East facade 1:1200



South facade 1:1200



West facade 1:1200



North facade 1:1200

Family life in a new light

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.

For the family inhabiting the First Active House in Russia, moving in was not just a change of address – it was a change of lifestyle. From a crowded apartment in central Moscow to a life with generous amounts of space and light.

"Here, we are surrounded by fields and forests," relates Asja Dunaevskaya. She is the mother of the family comprising her husband, Korney Krongauz, and their three daughters. They all love their new life in the Active House.

"The children can play hide and seek inside the house. And we really enjoy having a large kitchen," says Asja Dunaevskaya. The family was chosen to live in the house after contacting the partners behind

the building and announcing their keen interest in the Active House concept. They will live in the house for about six months. During that time, their experiences and opinions of the Active House, together with data of consumption and climate control, will be collected to provide valuable information for the next generation of Active Houses.

Some facts are already evident. The Active House can cope with even the harshest Russian winter. Around New Year, the house stayed warm, in spite of the fact that the temperature outside plummeted to -30°C. The house itself takes care of the indoor climate. Thanks to the automatic control system, the installations of the house respond to data

of temperature and air quality. For example, the windows can open automatically when sensors in the house register a temperature above the default level chosen by the residents. The control system can also be programmed to switch the lights on and off in response to the activities in the house. But in the biggest room in the house, the living room, there is not much need for artificial light.

"We rarely need to switch on the lights there because we have so much light coming in through the windows," says Asja Dunaevskaya. She and the rest of the family enjoy the extensive use of windows in the Active House, and not just because of the light. The windows in roof and walls affect the mood on a daily basis.



"With big windows you are closer to the whole world. It really changes your pace of life and state of mind," says Asja Dunaevskaya. She finds that the large windows have different advantages depending on the season and weather.

"On sunny days, the rooms are full of light and the house seems even bigger. It's great when you lie on a carpet and watch warm shiny specks of dust dance in the air. I get a feeling of enormous calm and happiness watching the nature around me. It's as if I am outside – but without the cold in winter and the heat and mosquitoes in the summer", she says, adding,

"of course the most practical thing is being able to look after the kids outside while you are inside."

The larger window area also enables the family to stay in contact with the surrounding neighbourhood.

"It's especially great to wake up and see the world waking up with you. Not only is the sun rising, but people are starting to move around, dogs are barking and running in the distance and the shadows are disappearing," says Asja Dunaevskaya.

Family facts:
The first residents of the First Active House in Russia are: Asja Dunaevskaya, journalist, Korney Krongauz, web-designer, and their three daughters.



Family blog:
Sharing the Active House life with the world.

As residents of the First Active House in Russia, the family is not just testing the house's functions and technical installations. They are testing the entire experience of the Active House. In the Russian-language blog "Diary of a family living in the Active House", they share

their thoughts with readers. In a humorous style, Asja Dunaevskaya and Korney Krongauz write about the ups and downs in Russia's first Active House. From the joy of relaxing in front of the fireplace to the experience that men and women tend to be fascinated by completely different aspects of the house's features. But the fireplace is popular among everyone and has a

special place in the house as well as in Asja Dunaevskaya's heart.

"I love staying at home in the evenings. It's dark outside, and it's warm and cosy inside. When it was cold, we lit the fireplace almost every day," she says.

The blog, which also contains photos, can be found at www.activedom.ru/family

Indoor climate

Comfortable in both winter and summer.

A healthy and comfortable indoor climate is crucial to human well-being. Active House principles state that these values should be compatible with energy efficiency. The First Active House in Russia shows how it can be achieved in both cold winters and hot summers.

A great indoor climate is easily recognisable – it feels good. But to obtain it, many factors must be taken into consideration. The First Active House in Russia uses a number of technologies in order to create an indoor climate that is pleasant, healthy and easy to regulate.

The Russian climate offers extreme shifts in temperature, ranging from +35°C in the summer to -35°C in the winter. A comfortable home must be flexible and easily adapted to the needs of the inhabitants. In the First Active House in Russia, the residents can rely on the home automation system by WindowMaster. The system can automatically open and close roof and vertical windows based on CO₂ levels in the house. Residents can choose default settings or individual preferences.

But actually the creation of the house's indoor climate began a long time before it was even built.

Thanks to 3D simulations, architects and consulting engineers were able to optimise the First Active House in Russia in the design process. The goal was to provide the house with large amounts of fresh air and daylight. One of the results is that the house has windows on all four sides.

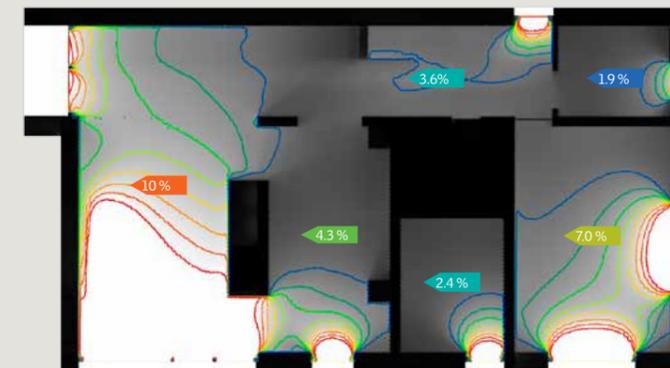
"Apart from creating great light, windows on all sides allow for better air intake. Regardless of the wind direction, the wind can be used for natural ventilation," explains architect Alexander Leonov. Natural ventilation can be obtained quickly and effectively through the so-called

stack effect. By opening a roof window and a facade window simultaneously, air change will happen quickly, thereby reducing the loss of thermal energy in the building. In addition, all roof and facade windows are equipped with interior and exterior blinds and awnings. They help prevent overheating on sunny days. Of course, the residents can also choose to regulate the temperature the old-fashioned way – by opening the windows manually.

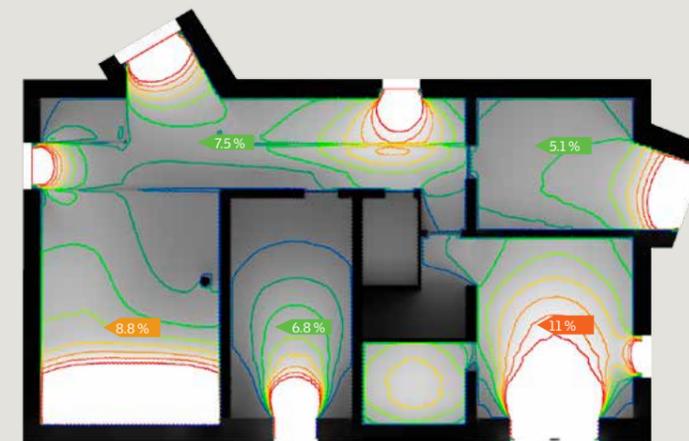
All in all, the design of the extraordinary influx of daylight coming from all directions, the automated natural ventilation and the sunscreening contribute to a comfortable indoor climate in cold winter nights and even in hot summer days.



Daylight factor



Ground floor



First floor

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

Active Houses combine energy efficiency with production of renewable energy integrated in the building. In the First Active House in Russia, this approach has created remarkable results, less than half the consumption of an average house.



Energy efficiency is part of the Active House principles. To obtain it, a building must be considered a whole and not just the sum of its components. The First Active House in Russia makes use of several energy-saving and energy-producing technologies. In addition, the design and construction of the house reduce the need for additional energy.

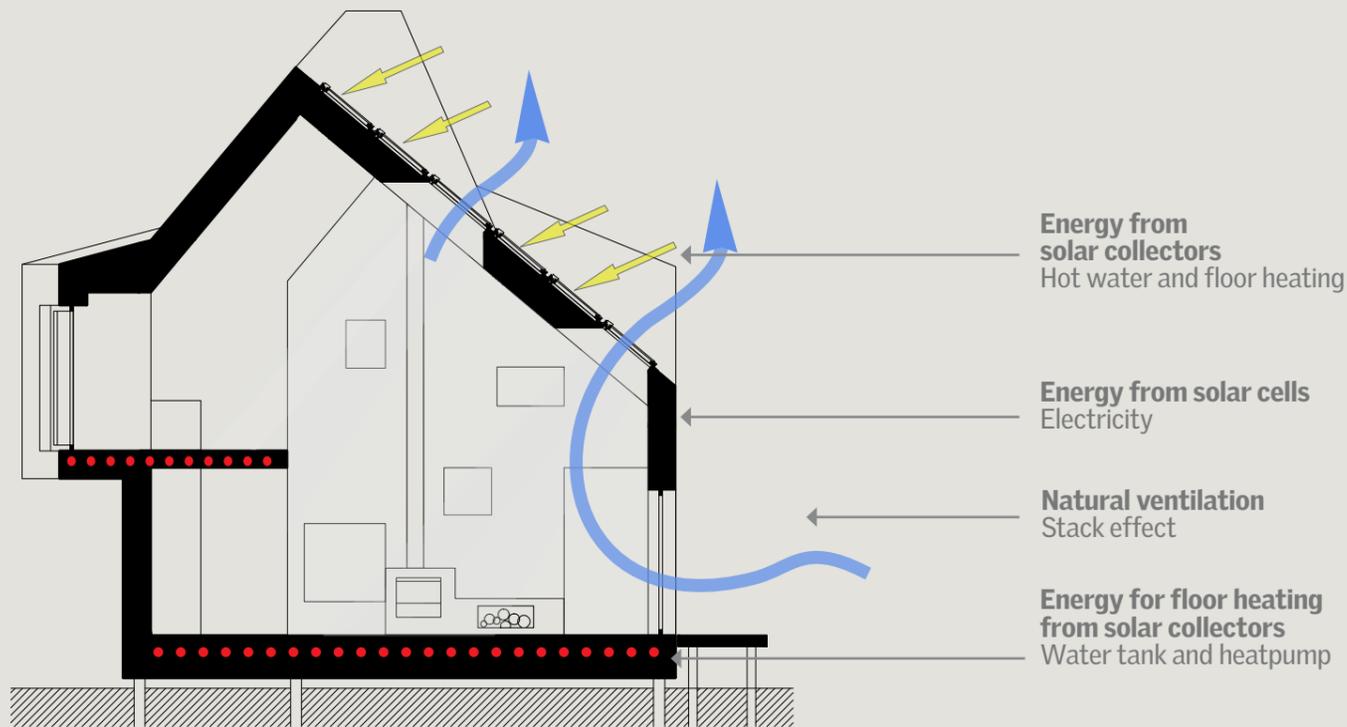
The house's primary energy source is sunlight. VELUX solar thermal collectors, installed in combination with the roof windows, provide heat for production of hot water. The solar collectors are designed to be both visually appealing and highly effective. They can generally provide up to 65% of the energy required for heating water.

A state-of-the-art heat pump and effective insulation throughout keep energy loss to a minimum.

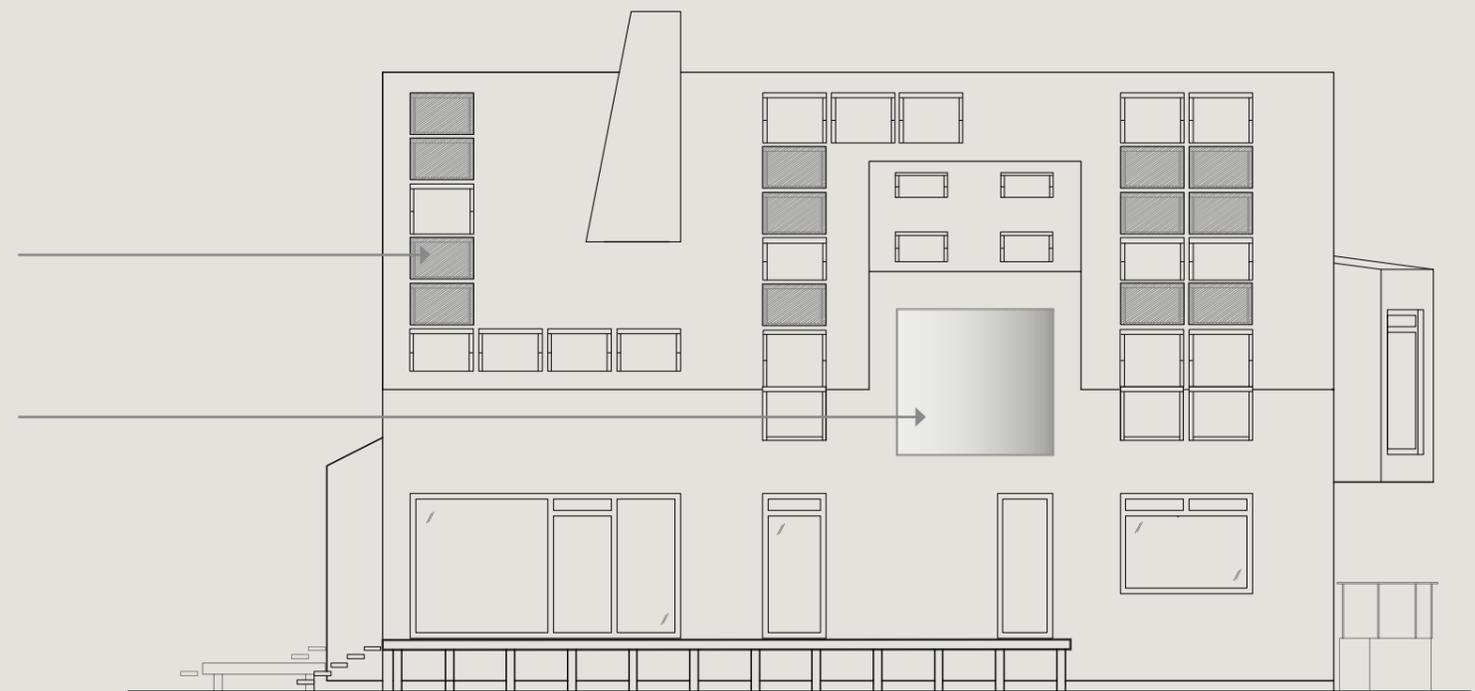
With a south facade and an extensive use of roof windows, the house utilises daylight in several ways; solar gain contributes to the heating of the house, while the inflow of daylight reduces the need for artificial lighting.

Together, these solutions keep energy consumption to a minimum. Data from the 6 month test period, when the house was occupied by a family of five, shows that the First Active House in Russia uses 129 kWh/m²/year. An average Russian single-family house uses 400-600 kWh/m²/year.

In other words, the First Active House in Russia uses less than half as much energy for heating, electricity and hot water as the average Russian home.



Section A



South facade

Environment

An Active House interacts positively with the environment by means of an optimized 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 construction of The First Active House in Russia. The company is a recognised leader in manufacturing products from hardwood processing in Russia. The NLK House building company has been granted a certificate from the Forest Stewardship Council. The FSC label means that the product is made out of timber that has been felled without causing harm to the environment and animals inhabiting the forest or to the people living and working in the neighbouring forest areas.

VELUX roof windows have a long life span – up to 40 years. Most of the timber used to make 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 ambition of this new standard is to help shape public opinion about sustainable habitats and to create a rating system for certification of green buildings and settlements in Russia. In practical terms, the aim of the Russian Sustainable Architecture and Building Council is to change the regulatory framework and legislation in the field of construction and architecture. The First Active House in Russia has been certified by the Russian Green Building Standard, receiving 85 out of 100 points.

The Russian national rating system for certification of green buildings is based on European standards, and the certification itself is carried out by the EcoStandard Group.

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. The intention is to draw public attention to the importance of caring for the environment while obtaining a healthy and comfortable life style.

Local environment

The First Active House in Russia 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 that provide the ability for later recycling or re-use. The wooden facade is durable and has a low CO₂ impact. Pile foundations were used, with the framework of softwood piles being assembled on site.

To test the house's performance under real life conditions, a family of five has been living in the house. During their stay, a number of factors have been monitored and the family's experiences have been collected.

Data from the first three months show that the house stayed warm even when the temperature dipped below -30°C. For engineer Oleg Panitkov, VELUX Russia, one of the driving forces behind the First Active House in Russia, the construction of

the house has been an example of how lofty ambitions and local expertise can create extraordinary results.

"We have gained a lot of unique knowledge and new ideas. Now I understand why car producers invest in Formula One," says Panitkov.

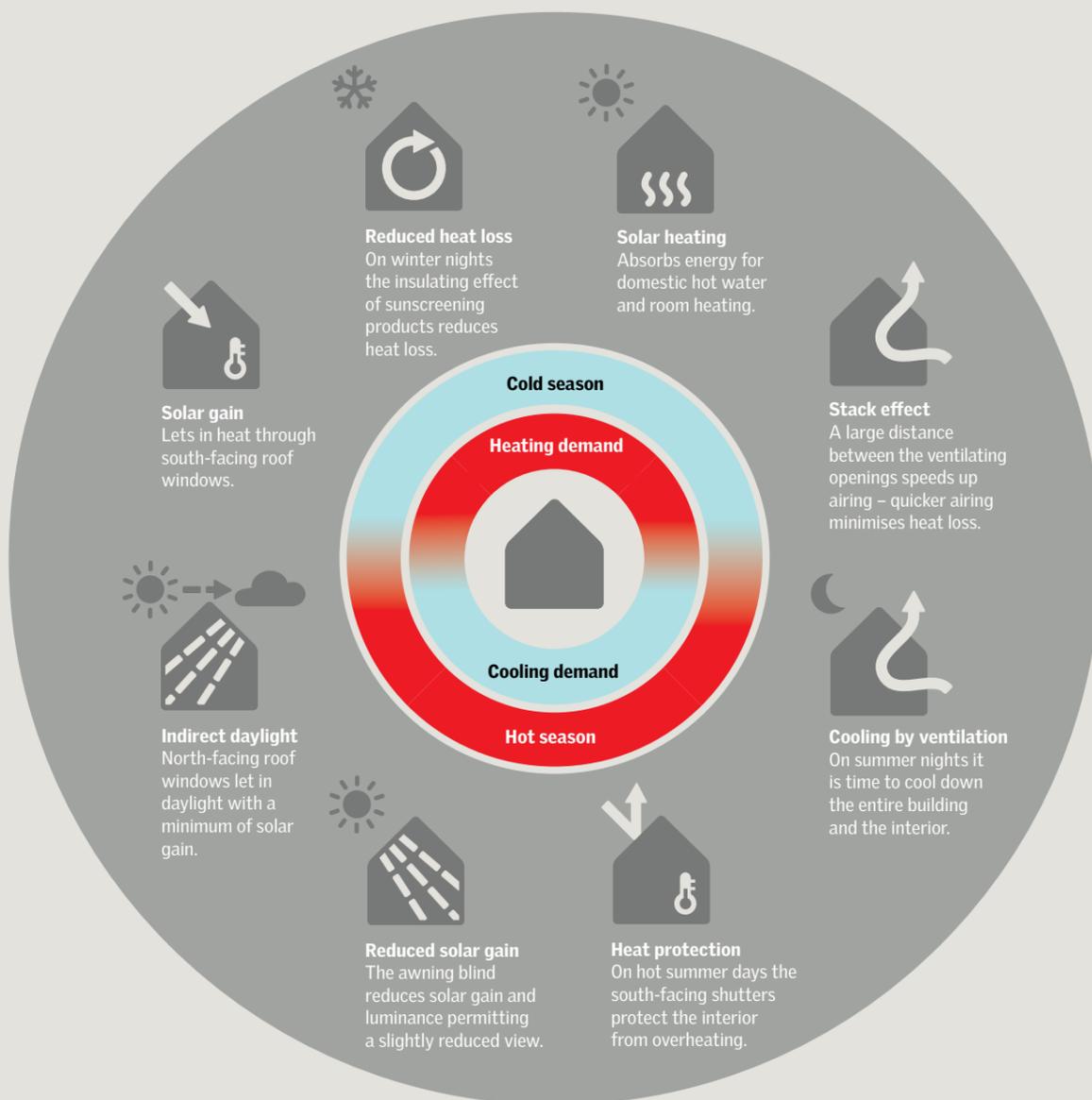


PEFC certified
VELUX wooden roof windows are from sustainably managed forest and controlled sources
www.pefc.org

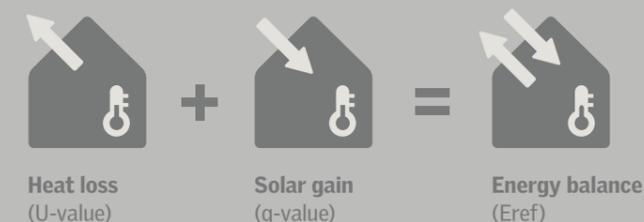


Living in daylight

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

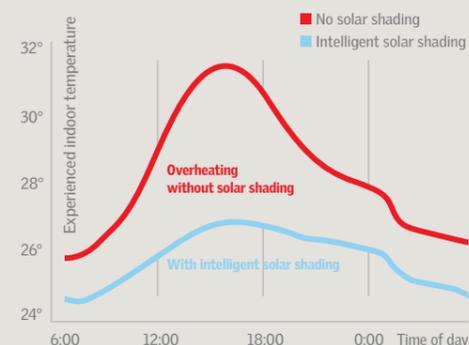


To measure the energy balance in a building using the advantages of daylight and energy from the sun, it is important to calculate the total energy framework. This means not only looking at how much heat is lost through the windows, but also including the windows' contribution to the heating of the house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





VELUX products

The First Active House in Russia

For more than 75 years the VELUX Group has created better living environments by bringing daylight and fresh air into people's homes all over the world. Our products help create bright, healthy, energy-efficient places in which to live, work, learn and play.

The VELUX Group has manufacturing and sales operations in more than 40 countries, with an extensive distribution network. Our products include roof windows and modular skylights, as well as a range of decorative elements, blinds, roller shutters, installation solutions and remote controls.

For more details, please visit www.velux.com



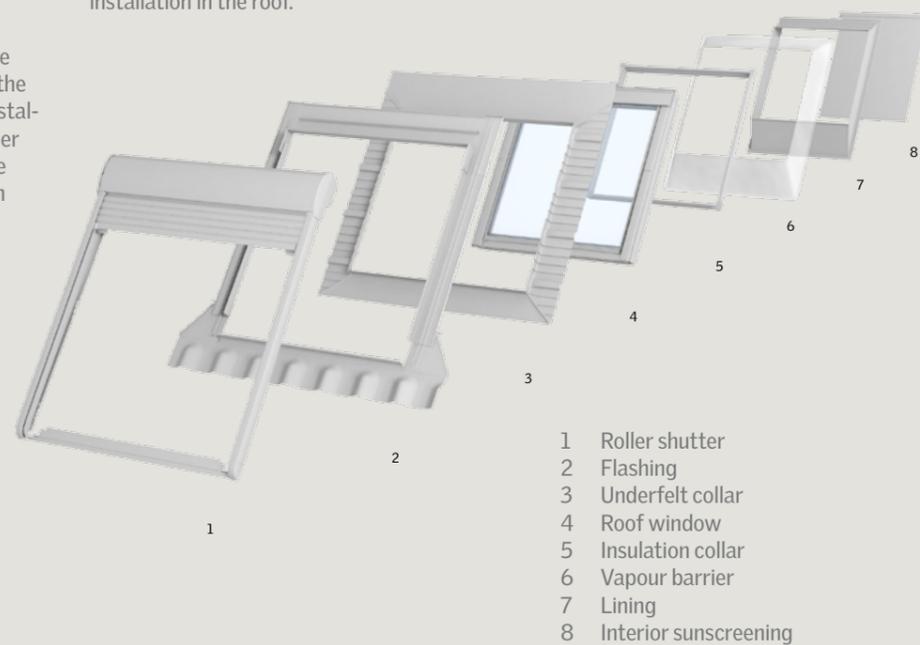
System solutions

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 75 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.



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.

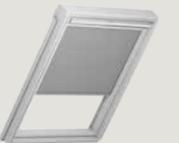


Exterior suncreening – electrically operated VELUX roller shutters. Model SML.

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.



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

experience 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.



The First Active House in Russia

Developers:



ZAGORODNY PROEKT

Partners:



Sponsors:



Supporting Organisations:



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