

Solskin

sustainable user-experience for buildings



## It all started with a simple question.

What would an optimal façade system look like that protects the building and its occupants from overheating and at the same time generate electricity?



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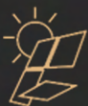
The result is Solskin: A dynamic PV system designed and tested during 8 years of research at ETH Zürich. It is now ready to enter the market in Q1 2024. The proprietary soft actuator is uniquely suited to the harsh outdoor conditions. By using three soft pneumatic chambers, Solskin is able to not only adapt the orientation according to the position of the sun, but also silently open up to unveil the view and let the light in.

## The results speak for themselves.

Solskin outperforms all other PV systems, regardless of the time of year or mounting location on the building.



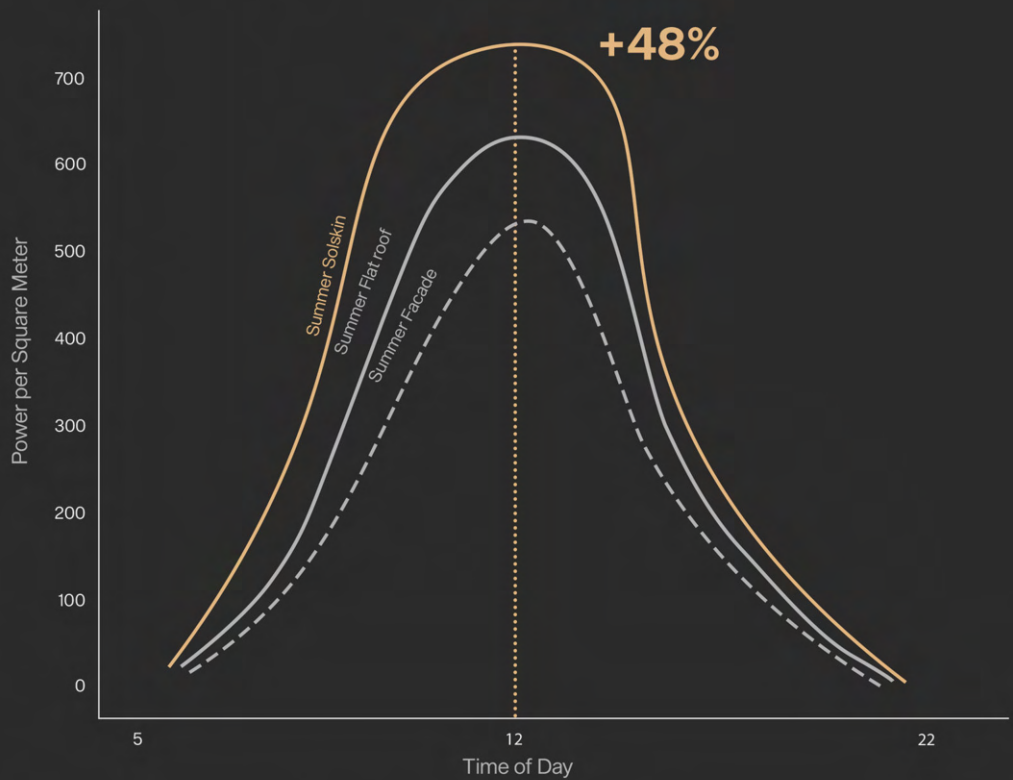
When placed in front of the windows, it is able to **reduce the energy need** by **20-80%**



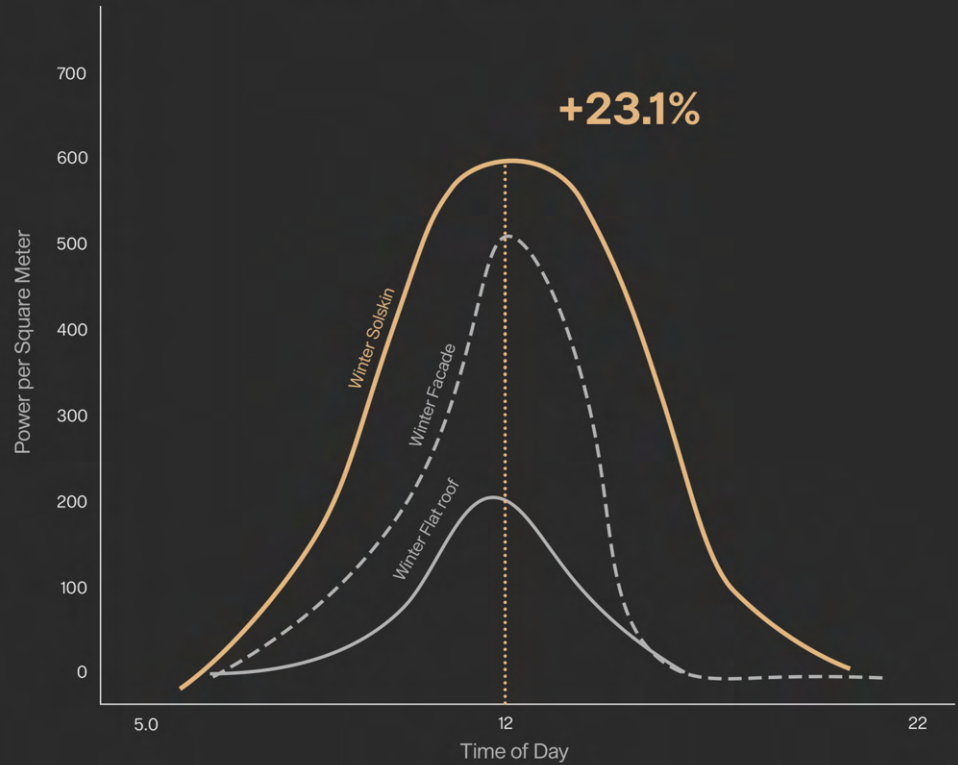
Our modules are able to **produce up to 40% more electricity** than **comparable facade systems**.

Our reported up to 40% increase in PV yield and up to 80% HVAC energy savings, demonstrated through energy and radiation simulations, are based on specific conditions and may vary for each building and location. Comparison should only be made with systems having the same active PV area. The extent of yield increase and HVAC savings depends on individual building characteristics. Evaluation of our system's effectiveness is recommended on a case-by-case basis.

Solskin vs. Other (Summer)



Solskin vs. Other (Winter)



Graphs based on real simulation  
21st of June and 1st of November

## Designed to make a difference.

Solskin is a one-of-a-kind photovoltaic system that can be integrated seamlessly into any building, be it company Headquarters, office buildings, residential complexes, industrial facilities or family homes, Solskin has you covered.

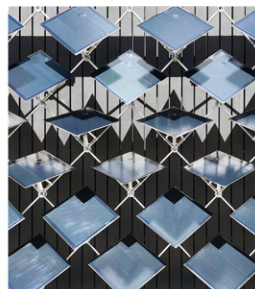


Thanks to its lightweight construction, installing the system is a breeze. After attaching only a few mounting points and hooking it up to the control unit, the façade becomes operational. Be it in front of windows, on the roof or simply in front of the building façade, the system will adapt to optimize both user comfort and energy production.



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Solskin as solar shading system / second building skin in front of window



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Solskin as second building skin in front of opaque façade wall

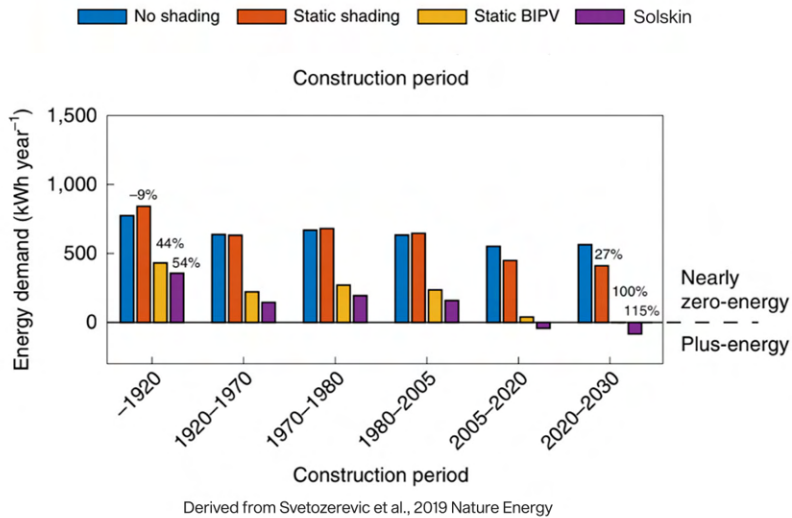


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Solskin as a canopy

Of course, it works in both summer and winter. The amount of energy saved is highly dependent on the building location and season. The closer the system is to the equator, the more energy it will be able to absorb and prevent from entering the building through the building skin.

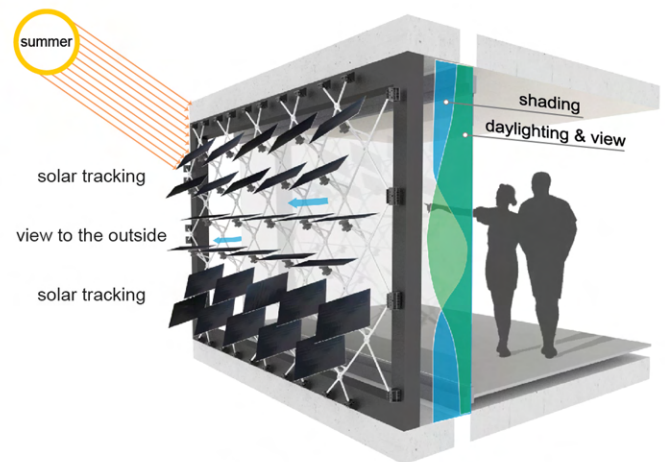




Our detailed energy simulations investigated the energy demand of typical office buildings in Zurich from different construction periods. We compared 4 categories of building configurations: buildings without shaded windows, buildings with statically shaded windows, buildings with solar facades (static BIPV) and buildings with Solskin. The bars clearly show that buildings with Solskin have the lowest energy demand and in some cases even produce more electricity than needed.

## It doesn't end there.

With Solskin, you are not only contributing to the fight against climate change, you are also prepared for its effects. Adaptive shading and smart control can massively reduce the hours of overheating indoors. The times where you spent your summer days in an overheated office are over. Even air-conditioning systems can be completely eliminated, or operated with solar power from the building's own production.



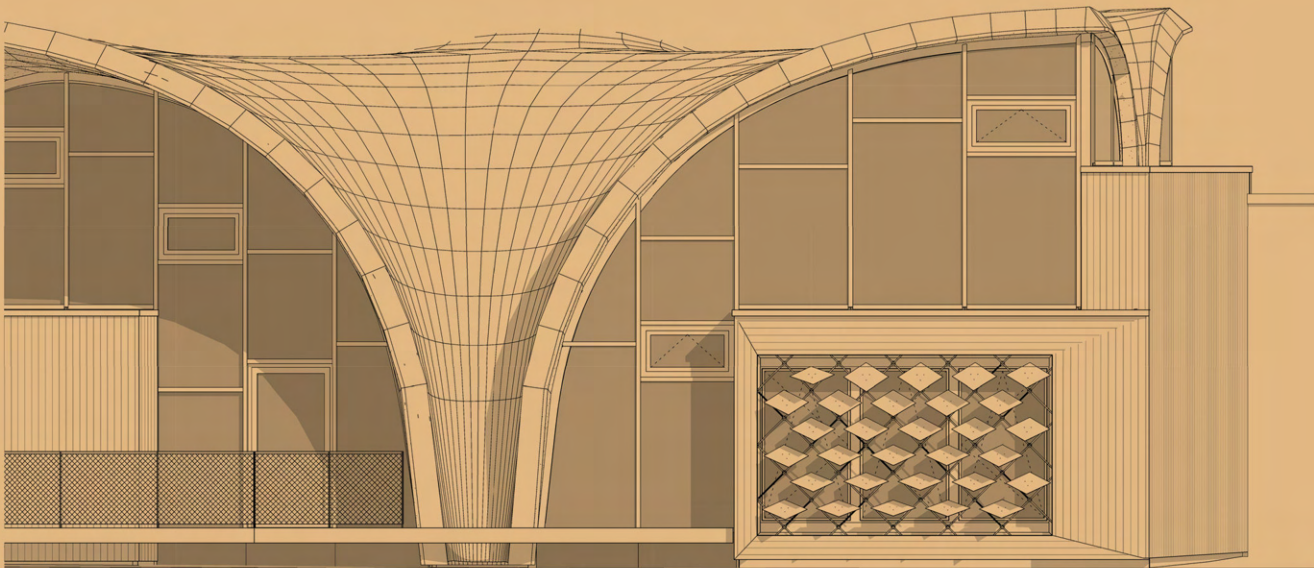
Derived from Svetozerevic et al., 2019 Nature Energy

## Robust and carefree.

Solskin will be certified for a lifespan of 20 years. We organize maintenance, repair and cleaning, so you can focus on what really matters.

## Be part of the solution.

By incorporating Solskin into your building, you'll be part of building a more sustainable future. Join us in our mission.



**SOUTH-EAST FAÇADE**

ROK Architekten  
Scale 1:100



9

m<sup>2</sup>

total façade area



1000

kWh

annual energy savings



100

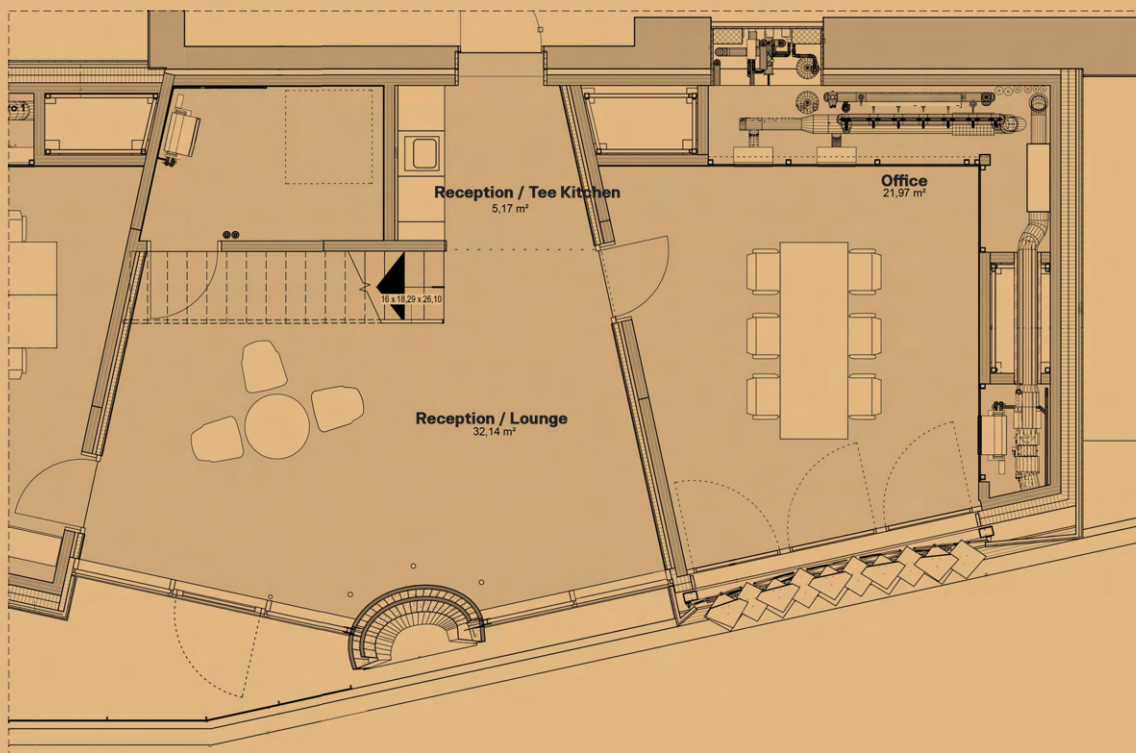
metric kg

annual CO<sub>2</sub> offset



The Adaptive Solar Façade installed at the HiLo unit, NEST in Dübendorf, 2022  
© Roman Keller (Zurich)



**FLOOR PLAN**

ROK Architekten  
Scale 1:100



The Adaptive Solar Façade installed at the HiLo unit, NEST in Dübendorf, 2022 © Roman Keller (Zurich)

NEST (Next Evolution in Sustainable Building Technologies) is the modular research and innovation building of the two Swiss research institutions Empa and Eawag and is located on the Empa campus in Dübendorf. The NEST platform closes the gap between the research laboratory and the market and allows new sustainable solutions to find applications in the construction industry. The unit HiLo (High Performance – Low Emissions) on the top of the NEST building demonstrates how attractive architecture can be when combining energy- and resource-saving construction and operation.

One fully glazed office in this unit is equipped with a 30 thin-film PV module Solskin (previously called Adaptive Solar Façade). The panels are constantly optimizing their position to either maximize the PV output or to adapt to the occupants' needs.

This version of the Solskin façade has an individual panel control system where different functions can be selected, such as move to East, move to West, open, close, and auto mode. The HiLo facade is a fully functioning demonstrator - in operation since October 2021.

**HiLo unit at NEST**



## Project Diamant of Keller AG

1300  
m<sup>2</sup>  
total façade area

95  
MWh  
annual energy savings

11  
metric tons  
annual CO<sub>2</sub> offset

The company Keller Druckmesstechnik AG is an innovative sensory company from Winterthur. The company invented an integrated silicon measuring cell to measure pressure in the most precise manner. The fully family-owned business is run by the two Keller brothers and has 480 employees. The company stands for the best quality and ensures this with its focus on the well-being of its employees.

The company is currently in the planning phase of a new main manufacturing plant that should be finalized by 2025. Serving as a working place for many people and machines, the building needs to be extensively cooled to remain at comfortable temperatures. For that reason, Keller AG wants to keep its electricity and cooling demand as low as possible. This is where the Solskin façade comes into play. It will protect the whole south-facing façade from the heat of the sun and produce PV electricity. Project Diamant is our first large flagship in planning. This new building will stand for the same values as the company itself: Precision, Innovation and Quality.





# Zero Carbon Building Systems Lab ETH Zurich

The Zero Carbon Building Systems Lab is a unique testing and research facility for building systems initiated by the Chair of Architecture and Building Systems at ETH Zurich.

The Solskin product demonstrator for the ZCBS Lab will be installed in Q3 2023, where it be fully tested and where Zurich Soft Robotics will conduct user tests to collect as much feedback as possible.

The new Solskin at the new high tech laboratory will have upgraded aesthetics and a slimmer design, along with other improvements. Follow our Website and sign up to our newsletter to belong to the first people to experience it.

24.7  
m<sup>2</sup>  
total façade area

1.7  
MWh  
annual energy savings

200  
metric kg  
annual CO<sub>2</sub> offset











# Solskin



Children are our future. Solskin façade inspires them to learn more about technology and design, as they can interact with it and have fun. The façade goes to the automatic mode and has “personality” of its own. Once every hour it sways in a beautiful wave-like motion. Our dynamic solar façade encourages young generations towards innovations.





As an important part of the school façade, Solskin may motivate children to think and learn about "green" energy technologies and robotics. Thanks to the unique movable solar façade, children may identify more strongly with their primary school and appreciate be inspired by the unique appearance of their school building. Solskin can even function as an information medium: e.g. it can show how much electricity façade produces or, thanks to different positions of PV modules, it can send different messages to pupils and teachers, but also to people living in the neighbourhood.

School buildings with Solskin may strengthen the identity of the place and become respectable examples for other schools and other buildings that are taking the necessary and responsible steps towards sustainable development and a low-emission environment.

## SCHOOL









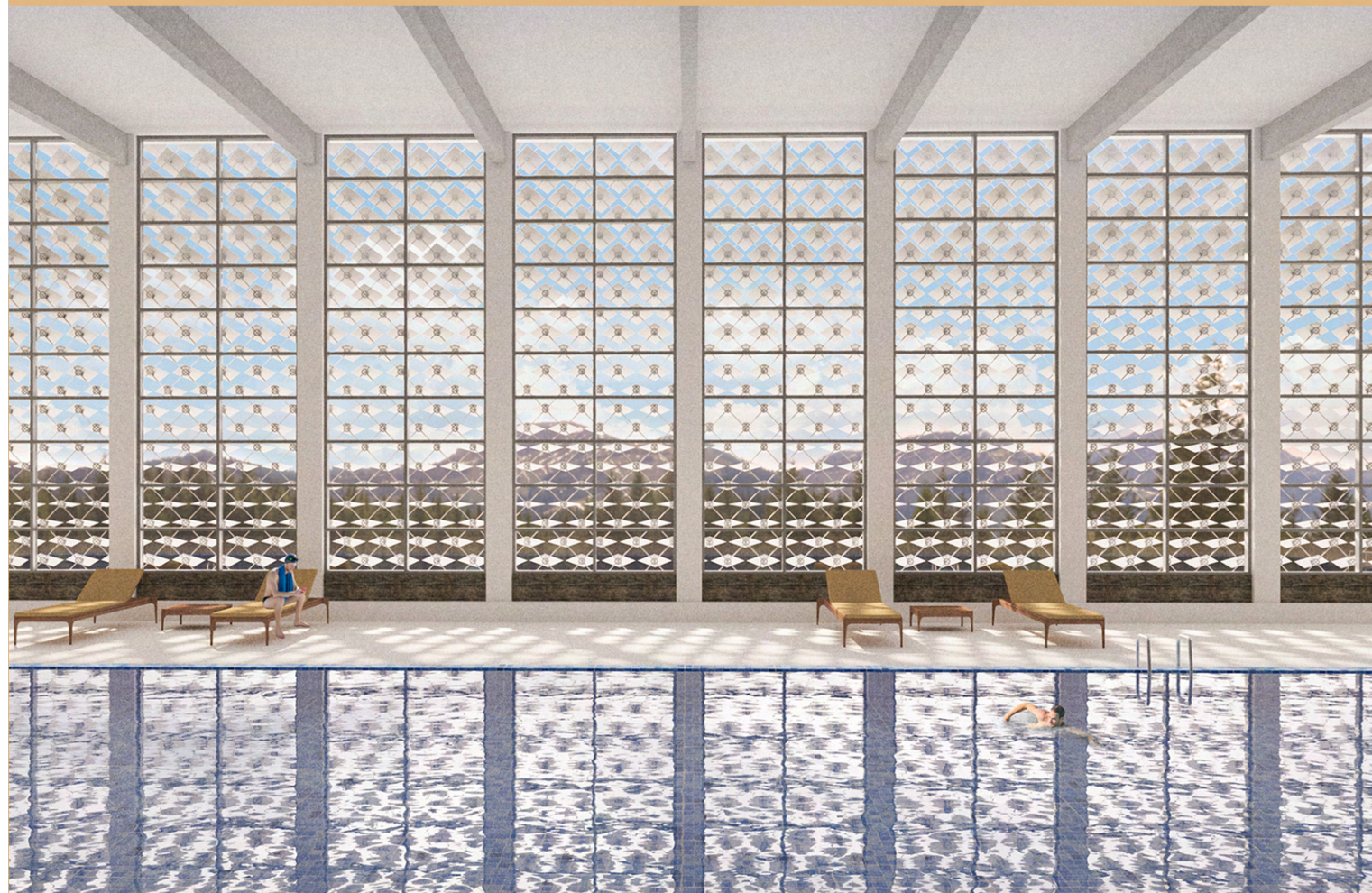
## POOL IN SPORT CENTER

Solskin is an elegant façade solution for large glass surfaces of sports centers, such as swimming pools, offering transparency and openness where and when desired while at the same time providing daylighting control and protecting spaces from views from the outside. Solskin projects a beautiful interplay of light and shadows to the insides of the swimming pool area, adding another dimension of beauty and freshness to the ambience when combined with water.



# HOSPITAL

Solskin fits perfectly into spacious, naturally lit, especially south- and west-oriented glazed entrances to various public buildings whose public-serving function is emphasized by welcoming elements of design and light. Solskin is an excellent façade solution because it balances the fulfilment of complex requirements of a public building entrance: friendly and welcoming, attractive, efficient, healthy, comfortable, enjoyable. Considering that from an emotional and psychological perspective, colour and control of daylighting may affect mood and even reduce stress, a Solskin façade can improve comfort and provide attractive, soothing atmosphere for patients, their families and visitors and staff, in places like hospitals and residential homes for the elderly. In addition to primary energy related benefits, the Solskin facade system helps to avoid sterile and monotonous appearance of buildings, making them inviting, homely and enjoyable.







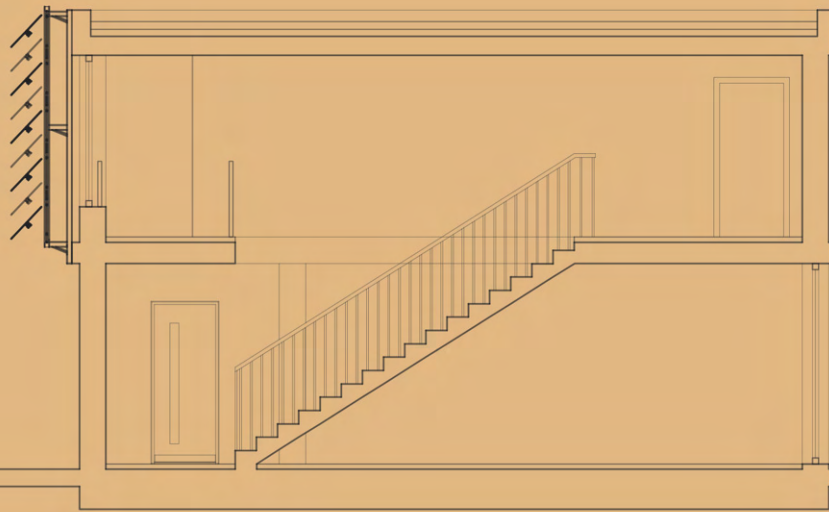
## FAMILY HOUSE





Solskin as a multifunctional, multi-layered, “active” and “smart” façade envelope on the southwest side of the single-family building. The movable and adaptive solar façade is implemented easily and nicely into the cubic geometry and modern design of the house, providing an exceptional energy performance, and visual and thermal comfort for the family. Of course, Solskin also seamlessly supports your sustainable mobility, charging your electric car with self-produced electricity. It further ensures constant visual contact with the surrounding, with one part of the building floor subtly merging with the surrounding, instead of being apart. Thanks to the transparent façade envelope, residents feel one with the surrounding nature, deeply enjoying sunrises and sunsets, rain, cloud movements or the sky at night.



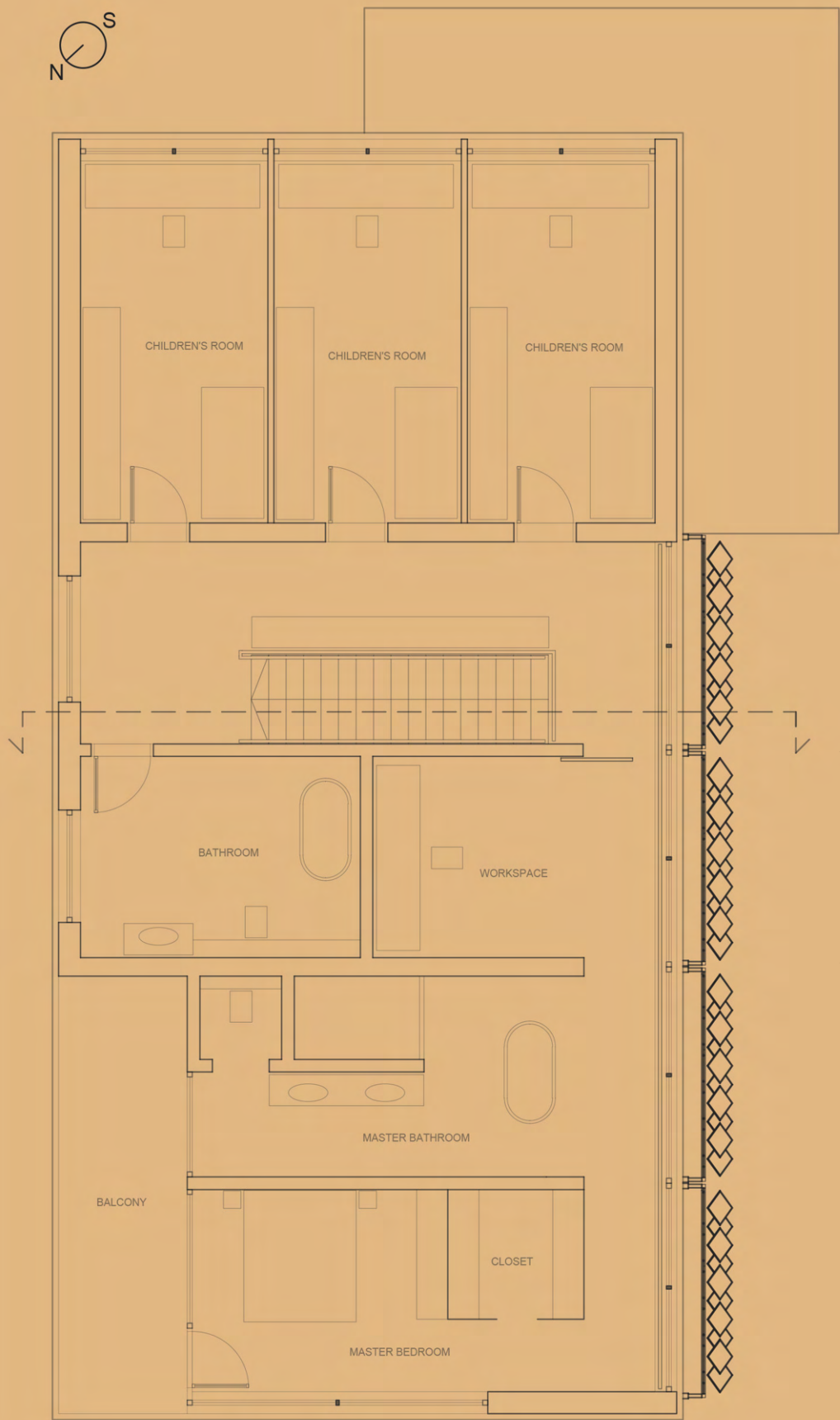


**SECTION**  
Scale 1:100



Implementation of a Solskin façade on a single-family building, with the accompanying adequate orientation, shaping and functional organization of the space, as well as materialisation, erases the sharp division between the inner and outer space. The surrounding is pulled into the interior through the transparent envelope with the Solskin façade, becoming an active participant in the life of a building and its residents. Through intensive contact with the surrounding, one is brought closer to and grows a deeper awareness of the natural environment, learns about the environmental changes and the importance of sustainable development.





The house is a unity of different ambiances, all of which merging the exterior environment with the interior, to a different degree and in a variety of forms. The functional wholes encircled with the Solskin façade are: the vestibule before entering the children's rooms and the bathroom with the upper floor gallery as well as the corridor and a part of the master bedroom.

The space is designed in such a way as to ensure the inhabitants a high degree of flexibility and freedom. The natural shifts of day and night, interplay of light and shadow through solar modules and weather changes profoundly impact the interior atmosphere. The residents experience their inner space as dynamic and ever changing, participating in the surrounding landscapes.

Scale 1:100  
**FIRST FLOOR PLAN**  
**FAMILY HOUSE**



*"Solskin offers the adaptive solar facade integrating multifunctional and aesthetical features on the building envelope. It not only gives the designers the flexibility of dynamic facade design but also provides highly functional performance and dynamic control on the shading, energy harvesting, ventilation, etc. Such an excellent solution significantly raises the value of the building envelope for the sustainability movement."*

Lau Siu-Kit Lau, Professor, Department of Architecture, College of Design and Engineering, National University of Singapore

*"... Solskin facade is offering creative solutions for renovation possibilities. While each project is unique, the Solskin facade system manages to adapt to each professional's needs and provide turnkey solutions and personalized support in every phase of the project."*

Dragana Mecanov, Lead Architect, Bexel Consulting d.o.o.

*"We cannot continue to design facades without integrating innovative BIPV systems, it is simply unsustainable. Adaptive Solar Facades by Solskin allows designers to merge the technicality of solar PV technology with the aesthetic of sustainable architectural design. It is probably, the flexibility of ASF-enabled occupant control that makes this innovative customizable system ingeniously unmatched."*

Daniel Attoye, Innovation & BIPV Consultant Abu Dhabi, United Arab Emirates

*"Solskin has great potential to transform our buildings from energy wasters to energy producers and convert our building facades into energy generators and thus contribute to our energy security."*

Silvia Domingo Irigoyen, Architect and Scientific Researcher, Lucerne University of Applied Sciences, Hochschule Luzern

*"The adoption of BIPV solutions worldwide is still lagging. This is irrespective of the fact global markets love to praise that 1 TWp of PV systems has been deployed out there. It is high time more BIPV systems are designed, tested and deployed across the massive built environments of the world found in cities. The Solskin solution is yet another good demonstrator that there are available solutions being rolled out which can eventually become mainstream."*

André Nobre, Vice President - Asset Management & Performance, Cleantech Solar, Singapore

*"In addition to sustainability and energy efficiency, Solskin facades are also very interesting from an aesthetic point of view. The basic element of this dynamic facade has a simple geometry, which represents a great potential for modular multiplication and coordination characteristic of different architectural typologies, especially for public buildings. The flexibility of the facade element also gives the possibility of increasing the semiotic and semantic characteristics of the facade and creating original, contemporary architectural ornamentation."*

Slavica Vuckovic, Professor, Faculty of Architecture, University of Montenegro, Podgorica

*"The sophisticated yet simple design of Solskin technology reminds me of the primary role of a facade in protecting against noise, heat and cold. However, this is a modern and sustainable way that adjusts through movement to achieve the best result. The eye-catching feature of this facade to wake up us about the future is very innovative and important..."*

Nala Taleb, Architect, SympaHaus AG, Lucerne

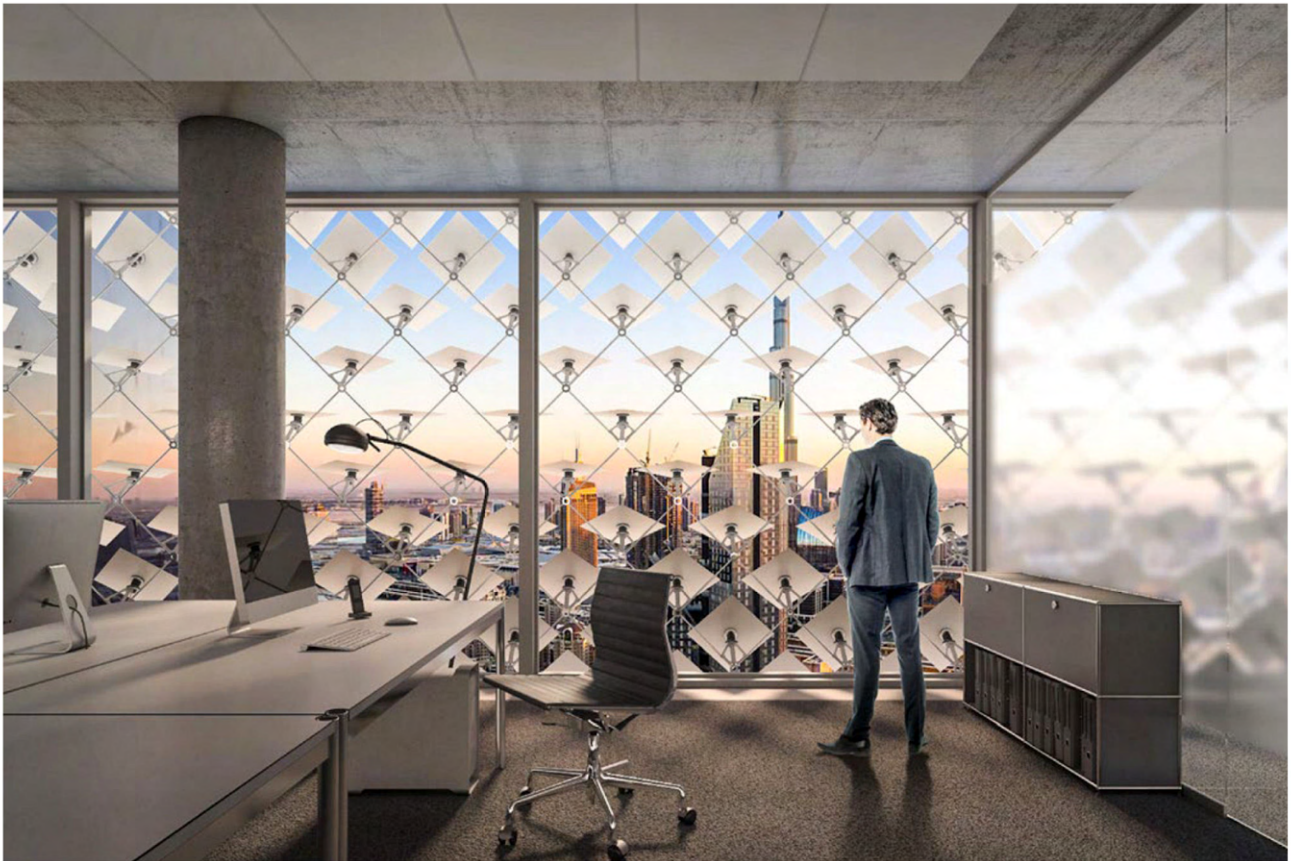
*"Thanks to its universal design, the adaptive solar system represents a huge potential for application on typologically different objects, contributing both to the functionality of the object and to the attractiveness of its aesthetics. On the other hand, the concept of the facade system fosters the implied authenticity that the building should possess. A great way to bring sustainability to a wide range of facilities."*

Djordje Cebic, Architect, 4 Waters d.o.o., Belgrade



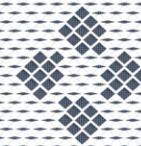
# Enjoy your day with Solskin

Solskin rises with a morning sun to open for the view. Then goes to a smart mode saving the planet or/and adopts to employee needs making the working environment dynamic and enjoyable. In the evening it provides the privacy and closes with the sun.



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Solskin



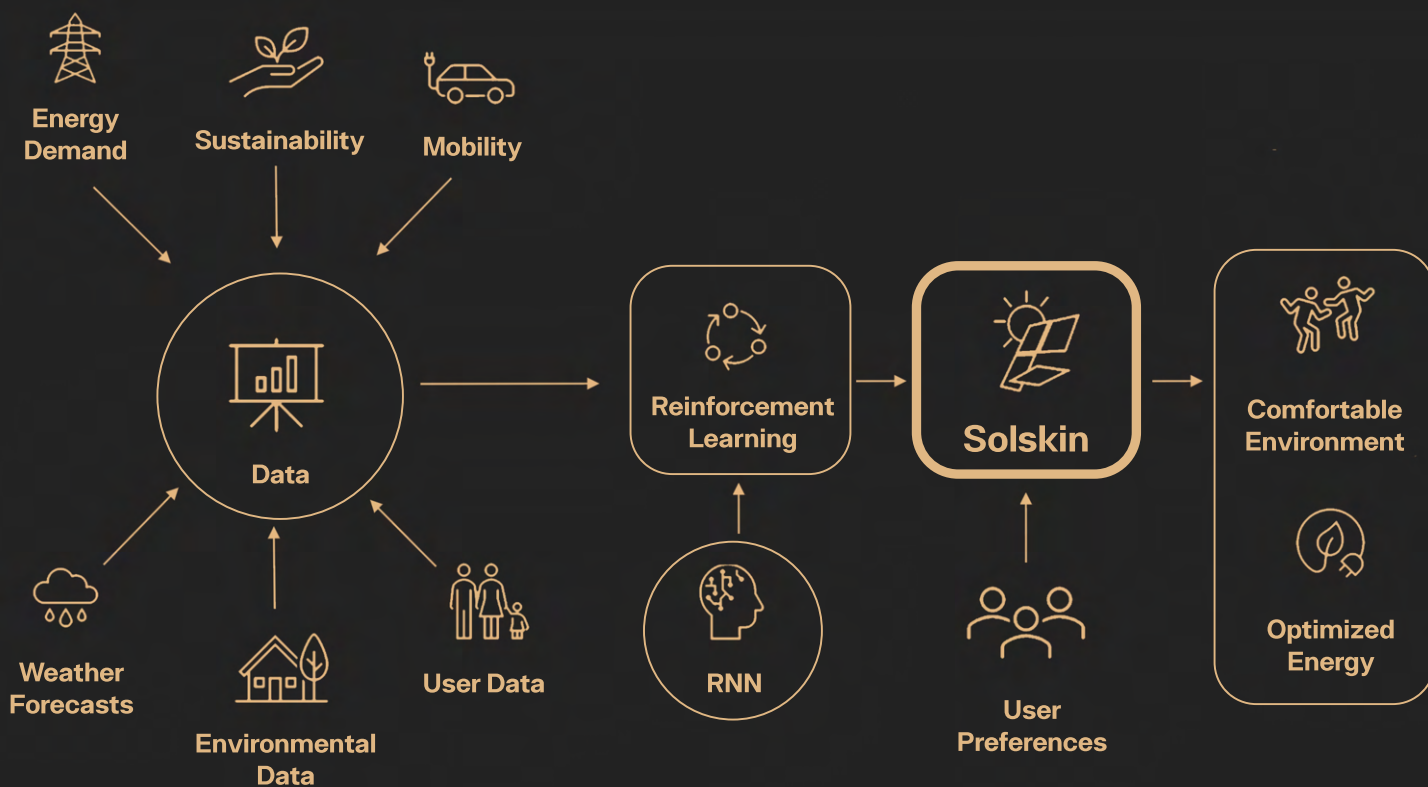
Facade that inspires



## Solskin® AI

### Adaptive Smart Control

At the heart of the Solskin user experience is Solskin AI, our state-of-the-art adaptive control algorithm to make you feel comfortable and cut your energy costs and emissions.



**Optimizes for cost savings and comfort -  
Offsets up to 80% of energy need of a building through self-learning control**

Our control algorithms can predictively optimize the behaviour of the façade using weather forecasts and user needs for comfort.

Predictive, self-learning-control is used to reach maximal cost savings and occupant comfort in regards to indoor temperature and natural lighting.

Our building models are based on neural networks and are easily adaptable to new buildings. The reinforcement learning based control ensures satisfactory performance of the system. In this way the façade continues to adapt to new circumstances to deliver the best results.



## Team



**CEO**  
**Dr. Bratislav Svetozarevic**



**Deputy CEO**  
**Dr. Lukas Lichtensteiger**



**Head of Architecture and Integration**  
**Dr. Vesna Kosoric**



**Head of Technology**  
**Gabriel Kreuzer**



**Head of Production and Industrialization**  
**Samuel Bernet**



**Head of Business**  
**Alexander Züst**



**Prof. Arno Schlueter**  
**ETH Zurich**



**Anil Sethi**  
**ETH Zurich**



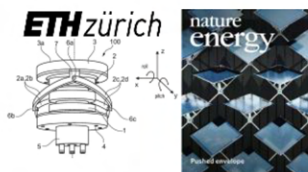
**Reto Largo**  
**Empa**

## Advisors

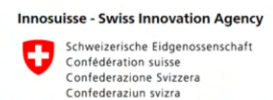
## Partners



## Achievements



**Proprietary technology,**  
**Nature Energy cover page**





[www.solskin.swiss](http://www.solskin.swiss)

