

DBZ interview – Ben van Berkel

Dear Ben van Berkel, the idea of gaining energy from sunlight is ancient. What was then a solar harvest is today a highly technical process. Do we not have to build knowledgeable today, but only efficiently?

Efficiency on multiple levels is of course extremely important if we are to design and build sustainable buildings that also meet net Zero Energy Building standards. However, it is never a case of one value completely suppressing another. In fact, a great deal of knowledge is required in order to successfully integrate passive and active sustainable solutions with all other design considerations. A fully integrated design process has always been our approach, however the advent of climate change introduced an urgent need for energy efficiency and this has meant that we now have many more new parameters to consider than was the case 20 years ago.

That said, our knowledge and the development of these efficiency technologies is ongoing and there is still progress to be made; there is still a lot of room for improvement. For instance, I am surprised that glass is the only material we use for PV modules. In the not too distant future, I believe it will be possible to also use other materials and surfaces (such as furniture) to transform solar energy.

Is the use of the sun's light energy via photovoltaics a real ecological way? Or does the use of energy- and material-intensive produced energy converters (PV module) not seduce you into building more than we should build?

Indeed, PV technologies are not yet as ecological as they could be, in the sense that they are still production and material-heavy. So, while the technology itself is getting more efficient and significantly more affordable, there is still room for more circular strategies and more experimentation with different materials. I do not believe however, that such technologies seduce us to build more; in the end they are an additional material in our existing palette, but one that offers solutions to very pressing problems concerning energy demand.

What was the first project of UNstudio that was realized with solar modules?

The first project in which we used PV modules was a multifunctional school in Amersfoort that we designed in the 1990s.

Does the solar system still work? And how does their architectural treatment differ centrally from today's solutions?

Yes, it still works, but over the years solar systems have been developed to become more effective, efficient and affordable, and with the introduction of BIPV, now offer a great deal more surface area with which to harvest solar energy. This is particularly important for high-rise buildings.

Solar panels are not just a technical product, they are also a design object for UNStudio. Why?

High-rise buildings do not have enough roof surface to accommodate the amount of solar panels that would be needed to make the buildings net zero, and whilst BIPV elements have made steps in the right direction, they do not offer a complete design solution for architects. The building's aesthetics have always played an important role. As you mentioned above, architecture is not all about efficiency. For this reason it is essential that PV modules become more versatile, both structurally and aesthetically. If we can achieve this, PV modules become a new, fully integrated and versatile material with which to design and build - and not merely a cumbersome add-on for the sake of energy efficiency.

In order to create a built environment that is energy neutral by 2030, 7 million houses and 1 million buildings in the Netherlands will need to be renovated and equipped with solar panels. A huge market. How can UNStudio play here? As Architects, Designers, Entrepreneur?

This market is not yet fully operational. We all have to follow the Paris Agreement and set targets, but Dutch policies mean that in the Netherlands we will be ready to transform our existing houses and buildings to be energy neutral. But this does not just involve energy harvesting through PV modules of course. It also requires other solutions, such as solar thermal technologies and thermal insulation, for heating and cooling.

At UNStudio, as designers and architects, we tackle this in multiple ways: aside from designing energy neutral buildings and environments, we also advise our clients, challenging them and raising their ambitions. At UNSense, as designers and entrepreneurs, we also need to find solutions to pressing large-scale issues, including climate change. But this is always a collective endeavor between many experts from many different fields.

Solar Visuals is an association of expert companies. Why is UNStudio / UNSense involved here, what is the goal?

UNStudio's Knowledge team originally worked on the research, design and development of the technology for Solar Visuals as part of a European research project and in collaboration with the Construct PV Consortium. Part of the focus of UNSKnowledge is material research. Together with Monopol Colors in Switzerland, we also recently launched a new, highly resilient and reflective paint called 'The Coolest White'; another product aimed at reducing heat gain in buildings and cities. However, once a product has been developed by our Knowledge team and their partners, it needs to go to market in innovative ways, and this where UNSense comes in.

How does Solar Visuals work? With whose money?

Solar Visuals, is an innovative entrepreneurial company, founded by research partners from the original consortium - UNSense, the printing company TS Visuals and 'ECN, part of TNO' – who together are currently further innovating and developing the product and bringing it to market.

In the past, solar technology and architecture go their separate ways. Now the façade is to be used as a building shell completely for the energy supply. What happened, did a dream come true?

I wouldn't go so far as to say it was a dream, but it is certainly a very good ambition to have: to merge energy harvesting and building materials together. But we are not the only party doing this, there are other companies developing new PV materials also, with similar aims. I consider this a very positive development for architecture and the construction industry.

How should solar-powered architecture be designed so that energy self-sufficiency can be achieved?

It is important to mention that photovoltaic systems are not the answer to everything. They are one of a number of solutions that can be used in a package to achieve self-sufficiency. As such, they need to work alongside solar thermal technologies, thermal insulation and other passive strategies such as shading, building orientation, maximising daylight and natural ventilation. That is our goal: to work with all of these solutions using integrated strategies.

How does UNStudio have to change in order to be able to walk the new path of solar architecture?

We don't need to change in any significant way. With every new product, we develop ideas for integration. It simply becomes a new aspect of our design thinking, similar to new design techniques, tools or other new materials.

Who will/who must become a partner?

Early adopters – developers and companies - who want to innovate with facade energy harvesting.

What is the biggest problem with solar architecture? And how do you want to solve it?

Exactly because of the ongoing development of these new materials, I don't think there are any real problems with solar architecture. We just need to learn to appreciate that there are these new materials at our disposal. We are no longer limited to just bricks, concrete and wood etc., which in the end, cannot offer us the same benefits in terms of energy efficiency.

Many people want less technology in their homes. But a PV facade is high-tech ... Is there a way out of this dilemma?

A PV facade is not really high tech. It's actually just the evolution of a, by now widely accepted, back-up system. There is of course also a difference between IOT, which is an active technology that helps you to control devices in your home, and an envelope that silently works to harvest energy for you without affecting your daily life in any way. For some people IOT is a great thing, for others not. But a technology that saves you money and helps the planet at the same time is usually a popular one.

Is it possible, is it conceivable and also desirable to cover every house with a solar active skin?

No, and that's also not the ambition. These materials are only meant for those that want them.

What about an old stone house in Tuscany?

PV roof tiles are currently entering the market, so they could be useful in such circumstances. And we mustn't discount the possibility that in the future stone may be able to harvest solar energy also. In the meantime, should the mood take you, you could always print limestone on to a Solar Visuals panel...

And what does that mean for the architecture and the city? The climate?

Nothing but good.

And what does the total energy architecture mean for the architect as designer?

It means we need to learn to design with new materials and discover new uses for materials. Above all, it means we need to educate ourselves to be more innovative. And not to forget, we can also play an active part - with the right research partners - in the creation of new materials.

Last question: What will be the future of PV technology as an architectural building material?

And: Do we really need PV skins to survive on planet Earth?

The range of affordable yet efficient products, materials and active surfaces will increase. And yes, PV technology will help us to lower our CO2 emissions and the carbon footprint of our buildings and cities. But, as I mentioned previously, they are only one part of a much more varied whole; one solution among many that have to achieve these goals together. Just like the architect.