ETH Zürich Foundation

Uplift

The impact of giving

№8

Making buildings more energy efficient
Excellence Scholar
Josien de Koning

Page 4

Far-sighted approach to combatting climate change
Donor
Roger Lienhard

Page 12

Funding focus

Research for our climate

ETH Foundation

Together for the climate

ETH Zurich/Markus Bertschi

The clock is ticking: climate change is one of the biggest global challenges we are currently facing – and potentially the most serious. If we are to meet the goal of the Paris Agreement and limit global warming to well below two degrees Celsius compared to pre-industrial levels, interdisciplinary research and its translation into society will be crucial. Through scientific facts, fresh ideas and climate-neutral technologies, researchers, young entrepreneurs and students at ETH Zurich are playing a crucial role in promoting climate-friendly thought and behaviour in all areas of life. The support of relevant research, technological advances and promising talent by donors and partners of ETH is fast-tracking the solutions that we all urgently need in order to combat and deal with climate change. I hope you take inspiration from our reports!

Detlef Günther
ETH Vice President for Research

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Cover image: Excellence Scholar Josien de Koning, see page 4

Searching for ways to make the biggest impact

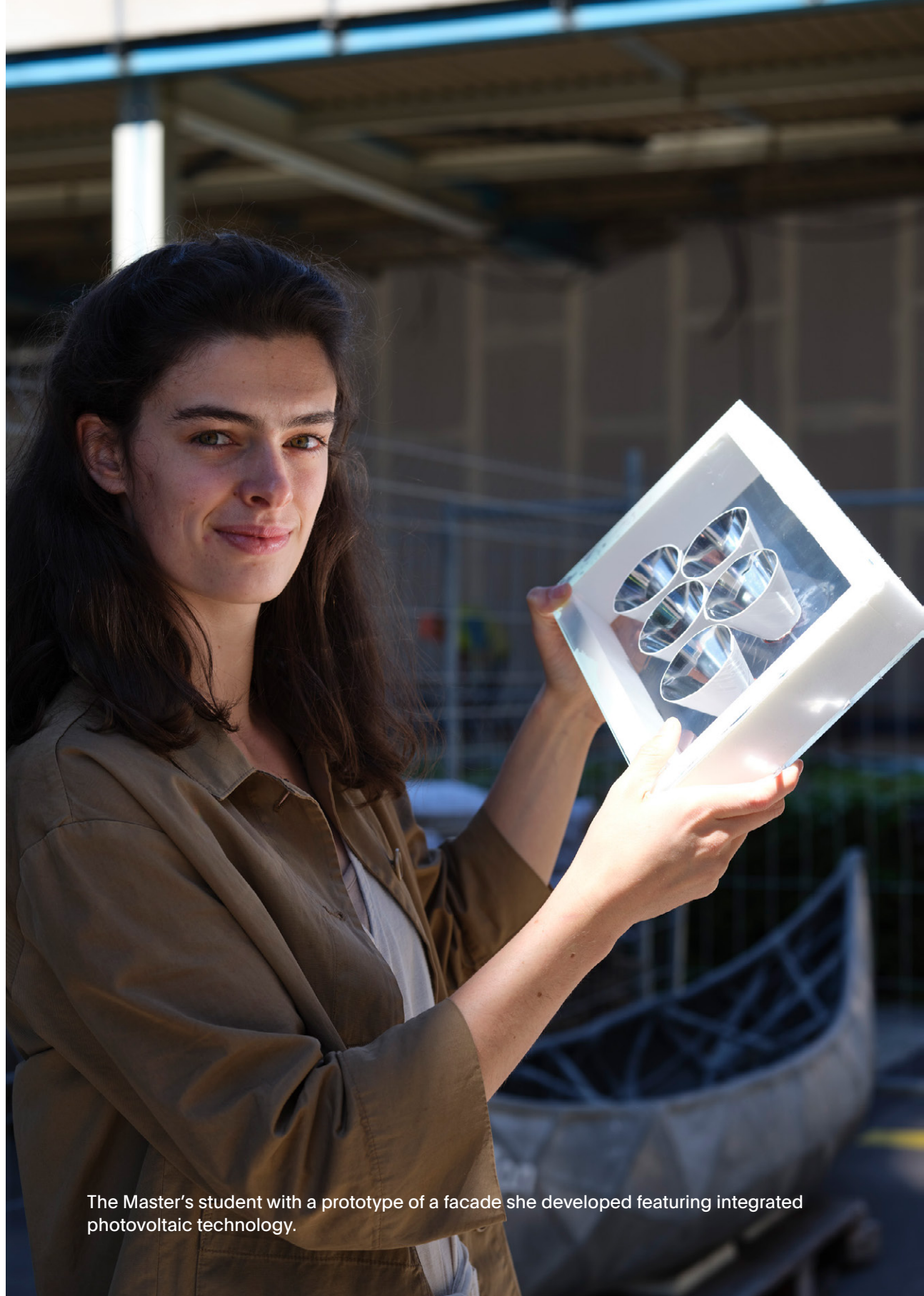
Excellence Scholar Josien de Koning is working to improve the energy efficiency of buildings. Creative and talented individuals with ambitious goals such as hers are playing a crucial role in ensuring that the construction industry does its bit for the climate.

“Challenging the status quo and developing viable long-term solutions” is how Josien de Koning sums up her day-to-day routine as she works on her Master’s in integrated building systems. Sustainability has been a key concern for the 23-year-old for many years now and, given her love of technology, this led her to move away from more traditional architectural questions and instead examine how sustainable energy technologies can best be integrated into buildings and districts.

Take photovoltaics, for example: “Solar panels don’t have a great reputation because we see so many examples where they’ve been tacked on to facades almost as an after-thought. The results aren’t very attractive. But it doesn’t have to be that way. Today we can work with a whole range of different colours and textures. We have a broad palette to choose from.” She quotes one of her lecturers: “Any south-facing facade that isn’t fitted with solar panels is a waste of a facade.” It is important that this technology is taken into account in the architectural design from the outset and becomes an integral part of the project. “The potential is huge,” the talented young student states, describing the opportunities in her field, before adding, “Architects need to work more closely with climate engineers.”

Sustainability as a common thread

At Eindhoven University of Technology, where Josien de Koning completed her Bachelor’s degree, she took on the role of “sustainable change agent“. At her instigation, student parties, and then many other on-campus events, stopped using disposable cups. To create habitats for bees and butterflies, wild flowers were sown on patches of lawn, helping to encourage biodiversity. Before commencing her studies at ETH Zurich, the Excellence Scholar gained work experience at the Utrecht-based architectural practice “Sustainer Homes”, which specialises in sustainable modular wooden building systems. “I was very grateful to receive the ETH Excellence Scholarship. For me, it confirms that I’m on the right track.” She is currently enjoying learning German. “I’m about to move into a German-speaking flat share.”



The Master’s student with a prototype of a facade she developed featuring integrated photovoltaic technology.

Idea after idea

The future could see Josien de Koning move even further from her native country: “Most of the construction work taking place today is happening in Africa and Asia. Cities there are growing at breakneck speed. And that means that we can achieve much more in these countries than in Europe.” The architect took her first steps in this direction in 2017 when she took part in a project constructing cob buildings in Kenya. In Europe, she’s particularly excited by the idea of retrofitting and renovating buildings to meet climate targets. Other issues on her radar include the interface between digitalisation and construction and the subject of storage technologies. “Sometimes it can almost feel a bit daunting, how much there is to do. But I’m ambitious, I have a lot of ideas and I enjoy exchanging information with others.”

She believes that, at the end of the day, it all comes down to people and their needs. If a home is intelligently designed and meets the needs of its residents, that can make up for any reduction in space, for example. Josien de Koning is a firm believer that, “You can make people happy with less.”

Supporting the next generation of talent

Every year, the ETH Excellence Scholarships support talented students in the top two to three percent of their year group. This allows them to devote themselves entirely to their Master’s degree studies and provides the freedom necessary for first-class research. This programme is made possible thanks to donors and partners.

Find out more about ETH Excellence Scholarships at www.ethz-foundation.ch/en/esop

Net zero target in sight

ETH professor Anthony Patt and his team are analysing how a sustainable energy supply, technological innovation and individual lifestyle changes could help eliminate greenhouse gas emissions – and which political approaches could speed up the process.

You are investigating potential strategies for tackling climate change with the Climate Policy group. What is your approach?
ANTHONY PATT – On the one hand, we simulate different renewable energy systems, modelling them with high temporal and geographical accuracy. This shows us what sort of quantities the various sources could produce. Building on this, we investigate, for example, how much storage capacity would be needed if Switzerland was looking to import as little energy as possible.
On the other hand, we work with surveys of public attitudes. An example: to achieve climate goals, we will need to increase electromobility. We asked what circumstances it would take for people to be prepared to purchase an electric car. According to the survey, one of the biggest needs is to be able to charge the car at home. Findings like this help to attune political decision-making to the issues people face.

You originally worked as a lawyer and environmental planning consultant. What prompted the move to academia?
In the mid-1990s, it became clear to me that climate change was set to become one of the greatest challenges of our time. I love snow and winter sports and wanted to help preserve winter for the generations that come after us. I was convinced that we needed to move away from fossil fuels altogether and the approaches being taken at that time did not seem to go far enough. I completed a doctorate in public policy, which tied in with my background in law and planning. Research offers me the chance to focus in greater depth on the issues surrounding climate change and on the public's perception of the phenomenon.

One of your current research projects is investigating the quickest way for Switzerland to achieve significant reductions in greenhouse gas emissions. What are the key findings?
To reach the net zero target, we need to switch to renewable energies and climate-neutral technologies, whether in air travel, in industry or in our personal consumer habits. As to the question of "how", there are several different ways, which all depend heavily on political decision-making. Should emissions from livestock farming be lowered by reducing consumption, or offset using new technologies such as direct air capture of CO_2? According to our calculations, removing the generated CO_2 would result in a price increase of around 5 to 10 percent for dairy and meat produce. Because livestock is a traditional part of Swiss culture, however, offsetting could be easier to achieve than a reduction in consumption. As another example, should our energy production be based entirely in Switzerland? That would mean we would need huge storage capacities, because days without sun or wind are not uncommon in Switzerland. But since it costs more to store electricity than it does to generate it in the first place, eliminating imports could be expensive.

Political frameworks are one thing. Do we also need to change our lifestyle in order to stop climate change?
The way I see it, more conscious consumption can't hurt. But major curbs are not a long-term solution, as the pandemic made clear. Emissions fell very heavily at the beginning of lockdown, but quickly rose again once easing began. We need solutions that work without personal deprivation. Models show that with the right political conditions and incentives, it is possible to achieve a total switch to renewable energy without much of any additional costs. Take the example of air travel: five years ago, choosing not to fly was the only way to reduce emissions. Today we have the technology to produce carbon-neutral fuel, as demonstrated by ETH spin-off Synhelion. If we could subsidise its production in the short term and gradually replace part of the kerosene, demand would increase and production could be expanded. Upscaling would lower manufacturing costs and larger quantities of sustainable fuel could be used year on year, without noticeably increasing ticket prices.

Your research is supported by philanthropic individuals. What role is philanthropy playing in the search for solutions to climate change?
Private donations can provide a boost to a wide range of research questions and fast-track answers such as the one here on the question of importing energy. This broadens the field of possible approaches.

How do you see the future?
I've become a lot more optimistic. I think it's looking likely that we will be able to reduce emissions in Europe to zero by 2050. That was inconceivable a few years ago. Major investment in the development and diffusion of new technologies over the last twenty years is starting to pay off.

More about funded projects and individuals:
www.ethz-foundation.ch/en/explore

"We want to play a role in ensuring that climate change is tackled as quickly and effectively as possible – so that future generations can also enjoy a wide range of opportunities."

Philippe Sarasin, donor

Fast-tracking climate research

Professor Patt's project "A quick end to Swiss greenhouse gas emissions" was made possible by donations from Giulio F. Anderheggen, Martin Bisang, Olivier Bizon, Doris Hangartner, Flora Keller, Roger Lienhard, Grégoire Notz, Ron R. Pal, Eric Sarasin, Philippe Sarasin and the Uniscientia Stiftung.

Entrepreneurship that benefits the climate

At ETH Zurich, ambitious young entrepreneurs are researching pioneering ideas that will enable us to use natural resources more sparingly. Support from the Pioneer Fellowship funding programme, which is largely financed through private donations, helps climate-friendly technologies and products to reach the market faster. This helps a wide range of ETH spin-offs to contribute to solutions to combat climate change. A selection:

Find out more at www.ethz-foundation.ch/en/pioneer-fellowships

Planted
Alternative protein: plant-based meat offers a sustainable and tasty response to the protein needs of the future.

FenX
Transforming industrial waste: creating non-flammable, recyclable insulation products from mineral waste lowers emissions in the construction industry.

Oxara
Sustainable house building: cement-free concrete made from clay-based excavation materials saves resources and reduces CO_2 emissions.

Digit Soil
Maintaining soil health: an easy-to-use portable sensor encourages sustainable land management.

Synhelion
Carbon-neutral air travel: fuel produced from sunlight and air allows climate-neutral travel.

Battrion
Increasing battery performance: the battery solution significantly shortens charging times for electric cars and improves safety through lower heat generation.

Revolution on a plate

Back in 2016, entrepreneur Roger Lienhard's long-term vision led him to begin investing in start-ups that produce sustainable alternatives to meat and dairy. His aim as an investor and as a donor is to promote research into solutions that combat climate change.

Professionally and personally, the goal you are looking to achieve is nothing less than the transformation of the global food industry. How did that come about?
ROGER LIENHARD – It was a rather circuitous journey. After an apprenticeship in banking, I founded my first company at the age of 19. We imported computers and fax machines. I was soon drawn to advertising and when the internet came along, I set up a business marketing advertising space on newspapers' online portals. After founding further software and IT-related businesses, I decided, at the age of 45, that I'd had enough of that area of the business world. I sold my shares and headed to California for a sabbatical. The "can-do" attitude and mindful lifestyle in Los Angeles instantly appealed to me. My daughter came to visit me and, after conversations with her, I decided I wanted to go vegan.

Changing your diet turned you into a visionary investor in sustainable food production?
The change in my diet was triggered by a love of animals. I noticed a gradual improvement in my performance when I was running or doing yoga. The more I found out about food production and livestock farming, the more I learned about the detrimental effect it has on our environment and climate. I was looking for a new role at the same time. I wanted to have a positive impact and give something back to society. I started visiting emerging companies on the West Coast that were working on alternatives to animal protein, for example Beyond Meat and Impossible Foods. They served me their burgers in meeting rooms and assured me that their produce would soon be indistinguishable from meat. Back then, five years ago, that was difficult to believe. But success has proven those pioneers right. Since then, we have invested in over 60 start-ups through my businesses Blue Horizon and Livekindly. Today we are the world's biggest investor in this field.

In your view, what is the next big thing we can expect to see in this market?
In terms of product categories, alternatives to seafood and chicken are on the rise, as are milk substitutes. In technological terms, plant-based products are ahead of the field at the moment. Fermentation processes for plant-based yoghurt and cheese and lab-cultivated meat are set to make a breakthrough in the next five to eight years, providing technological upscaling is possible.

“I support ETH to raise awareness in the fight against climate change.”

Roger Lienhard

You also invest in Swiss businesses such as Planted, an ETH Zurich spin-off. What is Planted doing right?
There is a huge demand for chicken worldwide and everyone is working on alternatives at the moment. Planted chicken, based on pea protein, is by far the best currently available on the market, thanks in part to donor support the business received during development. Wherever possible, I sample each product before I invest, and every week 20 new business plans land on my desk, so I’m not short of comparisons.

How do things stand in Switzerland where alternatives to animal protein are concerned?
The choice of products available has improved hugely, but more investment is still needed. A Silicon Valley start-up will quickly find funds for a good product. In Switzerland it’s still not easy. But the fact that ETH alumnus Lukas Böni and his co-founders at Planted have several successful financing rounds behind them shows that it is possible to find and win over investors here too.

What is your connection with ETH?
Meeting the founders of Planted and learning how their education and research led them to develop their expertise in this field and create a first-class product made a big impression on me. I very much enjoy being able to work with intrinsically motivated young people who are solving a problem and want to do something for the environment. I would like to see even more support for entrepreneurship at ETH, especially where climate-related innovation is concerned.

You support Professor Anthony Patt’s research (see p. 7) as an ETH donor. What motivated you to do that?
I want to help raise awareness of the urgency for solutions and draw attention to concrete approaches to combatting climate change. ETH is one of the best universities worldwide. Any facts and figures coming out of this institution hold weight and are recognised internationally.

In your view, what can each and every one of us do to help solve climate change?
Become more conscious consumers, and become a bit more frugal. Changing our personal consumer habits is simple and effective, because at the end of the day, companies will only produce in response to demand. The revolution can begin on your own plate.

Support teaching and research at ETH:
www.ethz-foundation.ch/en/together

Boosting climate research at ETH

The polar regions play a key role in global climate change. Your support is helping ETH Zurich to gain a better understanding of the interaction between climate, land ice, marine ice and ocean currents in the polar regions.

Our climate is determined by the complex interactions of the earth's different spheres: the atmosphere, the oceans, the land regions, the biosphere and the ice in glaciers and marine ice. The polar regions play an important role here. On the one hand, they are being affected by global warming at an above-average rate: the temperature increases we are currently seeing in the polar regions are twice the global average. On the other hand, the changes taking place in the polar regions are playing a significant role in reinforcing global climate change and its impact. Thawing permafrost, for example, releases methane, which adds to the warming effect. Melting ice masses are creating a rise in sea level and affecting the currents in the oceans and in the atmosphere. The polar cryosphere – the areas in the polar regions that are covered with snow and ice – plays a particularly significant role, with marine ice forming an important link between ocean and atmosphere.

Enabling specialist research

Climate research at ETH Zurich is among the best in the world, and numerous leading professors are working on a range of different aspects of climate change. Up until now, however, cryosphere research at ETH has focused primarily on alpine and polar glaciers. In-depth research into polar marine ice and its interaction with the climate is currently lacking, not just at ETH Zurich but throughout Switzerland.

To promote precise modelling and simulation of the processes and interrelations involved in climate change in the polar regions, ETH is planning to create a new professorship in "Polar Cryosphere and Climate". Focal areas will include investigating the interaction between the polar cryosphere, oceans and atmosphere as temperatures rise, and researching the role that marine ice plays in the global climate system.

The latest developments in remote sensing, climate modelling and data science are opening up new possibilities for significant advancements in this challenging and important field of climate research.

ETH and the Swiss Federal Institute for Forest, Snow and Landscape Research WSL are each contributing to the costs of setting up the planned professorship. Contributions from our partners and donors will enable us to make the professorship a reality.

Find out more about the professorship in Polar Cryosphere and Climate: www.ethz-foundation.ch/en/climateresearch

ETH Zurich/Iris Thurnherr

Their habitat is threatened by climate change too: penguins on the Siple Coast, the Antarctic coastline on the Ross Sea.

Valuable partnership for climate research

Support from donors and partners is fast-tracking important climate research. Since 2019, luxury skincare brand La Prairie has been supporting glaciology research at ETH Zurich. Daniel Farinotti, head of the Glaciology Group run by ETH and the Swiss Federal Institute for Forest, Snow and Landscape Research WSL, is very appreciative of this support: "La Prairie's contribution is enabling us to learn more about the impact of climate change on Swiss glaciers."

"We will only find solutions to the enormous challenges involved in climate change by working together. By providing the science and the technical innovations, ETH Zurich is playing a crucial role."

Doris Leuthard,
former Federal Councillor,
member of the Board of Trustees,
ETH Foundation

At ETH Week 2015: “Manufacturing the Future“

ETH Zürich/Alessandro Della Bella

Your contribution to our future

Science and technological innovation are more important than ever. We need answers to the challenges of our time, and one of the most urgent of those challenges is climate change. The keys to success are exceptional talent, excellent research and teaching, strong partners – and you. **Help fast-track findings and solutions to climate change!**

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