

EPFL

Annual Report

2023

ENAC

**School of Architecture,
Civil and Environmental
Engineering**

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Foreword

Last year started with an outstanding achievement: ENAC professor Andrea Rinaldo was awarded the Stockholm Water Prize – the most prestigious award in water research – for his work on understanding the hydrological and ecological processes in drainage basins. In this annual report, you'll find an interview with Prof. Rinaldo and a small selection of research accomplishments by other ENAC faculty members and students, along with educational highlights from the perspective of both students and teachers.

At ENAC, part of our mission is to transfer technology to industry. Our researchers created three startups in 2023 to explore opportunities in probiotics, air-pollution measurement systems and heat recovery.

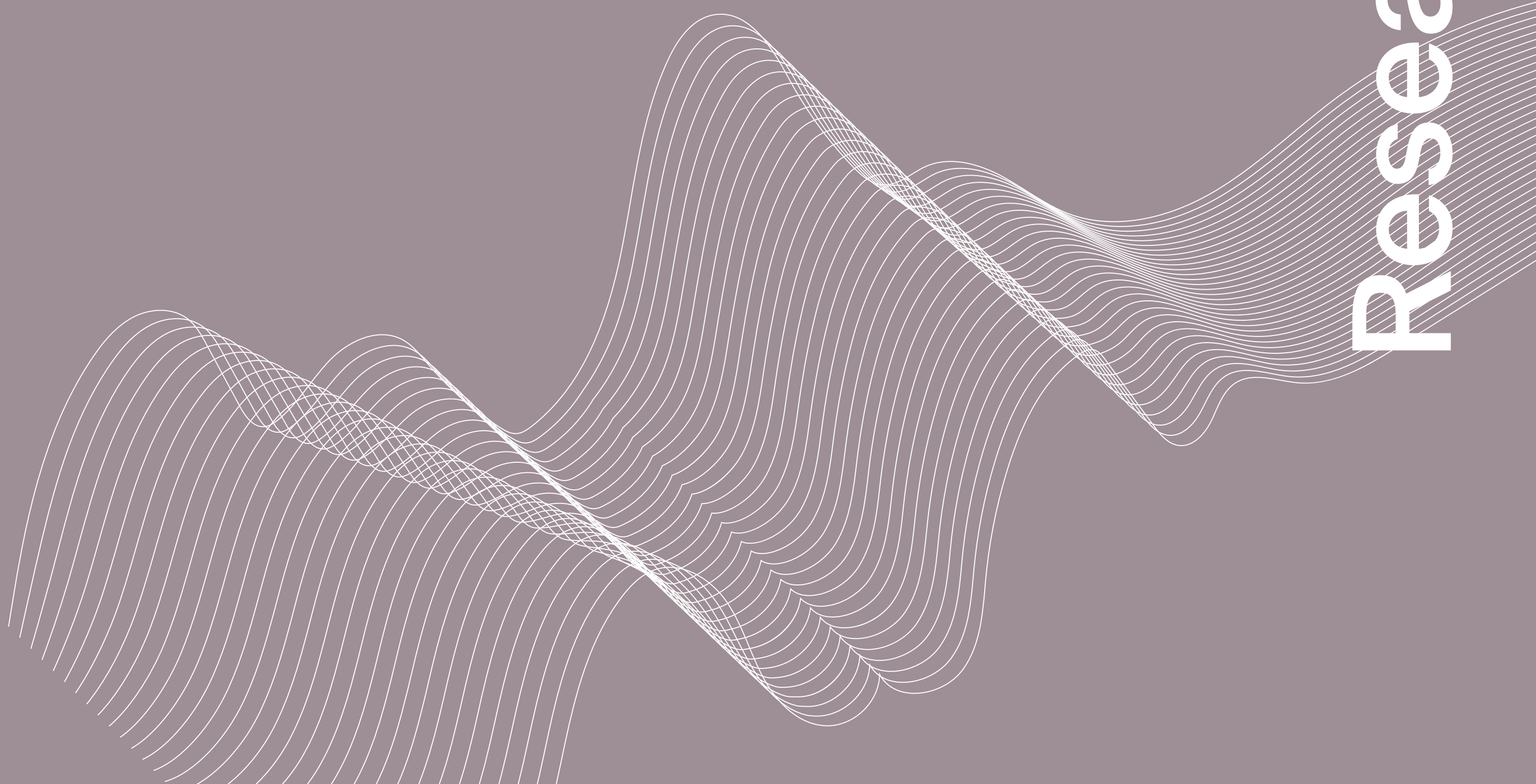
I would also point to EPFL's successful open house in 2023. Some 25,000 people visited our campus over the weekend of 29–30 April, and more than 200 ENAC employees volunteered to present our school's activities. Visitors were particularly interested in the research we're doing on climate issues.

It has been a pleasure to work as Associate Dean with former Dean Claudia Binder and former Associate Dean Vincent Kaufmann. I would like to thank them both for their commitment to the school's development. As we move forward, I remain committed to fostering excellence in research and education while recognizing the pressing need for action on global challenges. Together, we will continue to amplify the positive impact our school is renowned for.

Katrin Beyer

Dean, ENAC





Research

Andrea Rinaldo wins the “Nobel Prize in Water”

Author: Emmanuel Barraud
Photo: Fred Merz



Prof. Andrea Rinaldo, an EPFL expert in hydrology, has been selected as the 2023 winner of the Stockholm Water Prize – the world’s most prestigious award in water research, handed out by the king of Sweden.

“This award is a huge honor and a source of great satisfaction,” says Andrea Rinaldo, upon hearing he was selected for what’s known as the “Nobel Prize in Water.” He has been the head of EPFL’s

Laboratory of Ecohydrology – ENAC Faculty – since 2008 and is also a professor at the University of Padua. The work he’s done throughout his career has provided important insight into a recurring mechanism in hydrological and ecological processes in drainage basins. What makes Rinaldo’s approach unique is that he looks not only at surface phenomena but also at the underlying soil composition in areas where water streams converge.

A universal system of “ecological corridors”

“Living organisms have always propagated along flowing surface streams,” he says. “That’s true for microorganisms and wild animals just as much as for human beings. And if you look at rivers around the world, regardless of the surrounding landscape, they tend to adopt pretty much the same dendritic structure. That creates ‘ecological corridors’

that guide the movements of living organisms.” Based on this observation, scientists have developed mathematical models for predicting the propagation of invasive species and pathogens across a given region – for example, in event of a cholera epidemic. This marks a major step forward because it lets public health officials take the necessary preventive measures before a disease afflicts too many people. Torigny Holmgren, the

executive director of the Stockholm International Water Institute – the organization that grants the Stockholm Water Prize – notes that “Andrea Rinaldo has significantly advanced our understanding of the complex interactions between the hydrologic cycle, ecological processes, and landscape evolution. His models have provided us with invaluable tools to preserve and protect life through informed policies and practices.”

EPFL President Martin Vetterli says the award “is a testament to the excellent research Andrea is conducting and underscores how important it is for scientists to obtain a thorough understanding of such fundamental biological processes as disease propagation in nature.”

Born in Venice – a “floating city” that undoubtedly shaped his career interest in water – in 1954, Rinaldo has made an outstanding contribution to his field. He’s the author of over 300 journal articles as well as several books published by major scientific publishing houses. He’s also carried out field research in Haiti, Burkina Faso, South Sudan and other countries.

Rinaldo will receive the award from King Carl XVI Gustaf at a ceremony in Stockholm in August. “I’m particularly honored to follow in the footsteps of my friends and colleagues who I worked with on many occasions and who have preceded me in winning this distinguished prize,” says Rinaldo.

Andrea Rinaldo’s research in EPFL news:

26 August 2020: «[A model for keeping the pandemic in check in Italy](#)»

3 June 2020: «[The health of ecosystems based on the ground beetle](#)»

27 April 2020: «[Containment measures avoid 200,000 hospitalizations in Italy](#)»

15 November 2019: «[During epidemics, access to GPS data from smartphones can be crucial](#)»

27 February 2018: «[Halting the spread of cholera through a neighborhood response](#)»

25 October 2017: «[Developing a “gravitational theory” for ecology](#)»

24 October 2017: «[Tracking a parasite that’s ravaging fish](#)»

2 February 2016: «[Topography shapes mountain biodiversity](#)»

EPFL architects rethink the city-river balance within neighborhoods

Author: Rebecca Mosimann
Photo: LAST - N. Sedlatchek

Architects at EPFL have developed a new, multi-criteria evaluation method to support better decision-making for the redevelopment of brownfield sites in Geneva, Sion and elsewhere along the Rhone.

The banks of the Rhone are home to acres of urban land ripe for redevelopment. A new paper by architects at the Laboratory of Architecture and Sustainable Technologies (LAST), within EPFL's School of Architecture, Civil and Environmental Engineering (ENAC), puts forth an evaluation method that could help policymakers and practitioners identify the planning priorities and constraints specific to these sites. The study, dubbed Rhodanie Urbaine, is led by Emmanuel Rey (head of LAST), Martine Laprise, and Sara Formery, who carried out the research as part of her PhD thesis. Their most recent findings appear in *City and Environment Interactions*.

Why did the architects choose the Rhone specifically? "We've identified more than 1,400 neighborhoods in transition along its banks, covering a combined area four times the size of the city of Geneva," explains Rey. "This offers enormous potential in terms of brownfield development." Moreover, there's growing tension between competing demands along the river: climate change is pushing flood protection measures higher up the agenda, while riverside communities are crying out for high-quality housing and urban infrastructure fit for modern lifestyles.

Age of reconciliation

According to the architects, we've entered an "age of reconciliation" in the city-river



relationship. In ancient times, people lived close to rivers, using them for transportation and as a source of natural resources. In the Middle Ages, communities tended to move away from the water's edge and build fortifications on higher ground. At the height of the industrial age, rivers were prized for their utility, with infrastructure and factories springing up along their banks. Today, however, industry has severed its ties with waterways, leaving these parcels of land underused or abandoned altogether.

For their study, the architects identified four locations of

interest: two in Switzerland (in Sion and Geneva) and two in France (in Givors and Avignon). The Sion site, located between the train station and the highway, stands in an area earmarked for redevelopment under a recent planning request for proposals. The Geneva site, meanwhile, is situated in the La Jonction district. It features a former factory now used as a cultural center, plus a depot owned by the Geneva public transport operator.

"Most research of this kind looks at urban areas as a whole," says Rey. "Our approach is different in that we tackle

urban development and planning issues on a smaller scale, focusing on individual riverside neighborhoods. This lets us explore more possibilities and think beyond established practices. One way we're doing this is by building bridges between research and teaching." Over the course of the four-year study, around 30 second-year Bachelor's students in architecture developed detailed proposals for the four sites. "We then reworked the proposals at a series of summer workshops, coming up with three visions of what each neighborhood could look like in the future," adds

Rey. "Our resulting plans are custom-designed for each site, reflecting deliberately different architectural approaches."

An array of evaluation criteria

The 23 architects applied their evaluation approach, which involves using indicators to compare distinct proposals, to each of the three visions. Formery explains: "We started with sustainability criteria, focusing in particular on lifestyle and environment-related issues." She then spoke with subject-matter experts and delved into the literature to identify other criteria for

shaping a new city-river balance, spanning topics such as flood-risk management, the energy transition and environmental dynamics.

The resulting decision-support tool, which contains 18 indicators in total, can be used to evaluate planning proposals at different scales. Taking the energy transition indicator as an example, it can show whether a particular vision for Geneva's La Jonction district is consistent with the canton's overall strategy. At the city scale, it can be used to evaluate plans for shuttles, pedestrian bridges and other river transportation aspects. And at the neighborhood level, it provides insight into carbon neutrality proposals, such as whether river water could be used to heat or cool buildings.

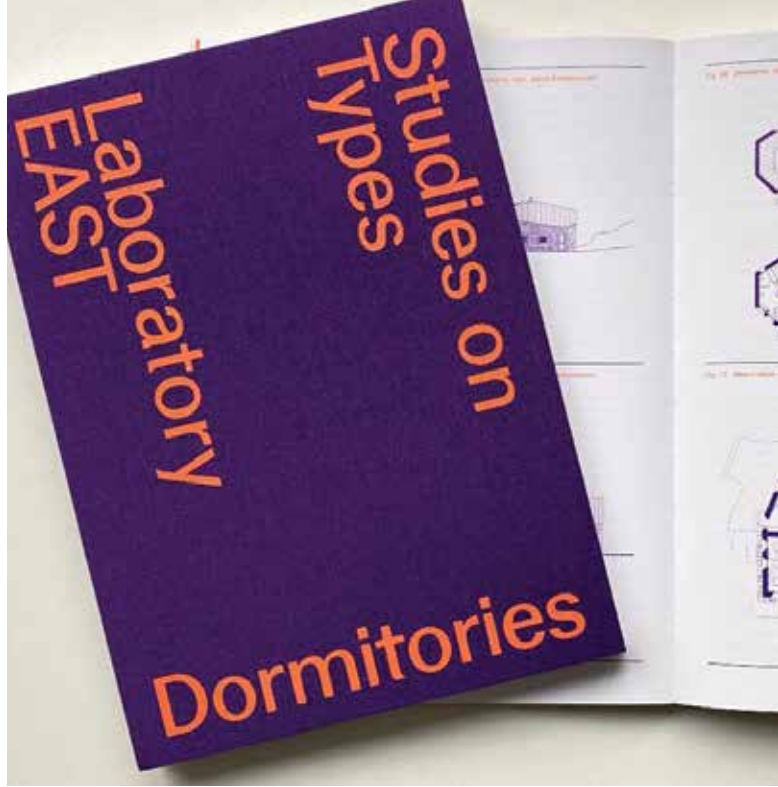
"Our tool provides a more granular, decidedly local picture of what opportunities the river offers and how it interacts with the city," says Rey. "In this sense, it makes the case against generic planning."

References

Sara Formery, Martine Laprise, Emmanuel Rey, "Promoting a city-river balance within neighborhoods in transition along the Rhone", *City and Environment Interactions*, Janvier 2023

Projet Rhodanie urbaine

Learn more




SLEEPING IN THE SAME ROOM: EXAMINING DORMITORIES AS ARCHITECTURAL TYPES

 A publication explores the unique history of dormitories from the Middle Ages to present day. Drawing on a corpus spanning everything from submarines to mountain huts, the authors examine the fine balance between the need for privacy and the function of dormitories as collective spaces, and reflect on the implications for contemporary challenges.

Learn more

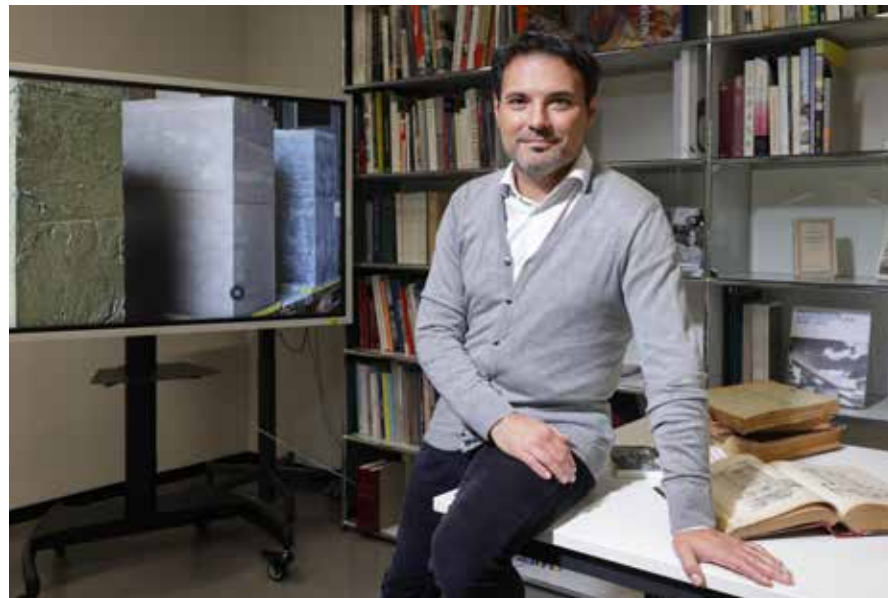


EPFL PUBLISHES MONOGRAPH ON LE CÈDRE, A JEWEL OF SWISS ARCHITECTURE

 Two EPFL architects have completed a detailed study of the headquarters of Vaudoise Assurances, a Lausanne-based insurance company, with a view to informing future restoration work. The opening of the book took place on 16 March 2023 at the Musée cantonal de design et d'arts appliqués contemporains (MUDAC), in Lausanne.

EXPERTS REVIVE ANCIENT TECHNIQUES TO MAKE CONCRETE MORE SUSTAINABLE

 A team of experts from EPFL, ETH Zurich and a Geneva-based architecture firm has developed a new type of non-reinforced concrete made from stone offcuts. Their method, which reduces the use of carbon-intensive cement-based binders, draws on ancient techniques uncovered in historical archives.




NEW LANDSCAPE ATLAS HELPS US ENVISION PARIS IN THE FUTURE

 EPFL's Habitat Research Center has created the first atlas of Paris landscapes, after winning a request for proposals by the French government and the City of Paris. The atlas is the result of a highly innovative approach to urban research, as it includes not just maps but also testimonials from local residents.




SCIENTISTS DELVE INTO NATURAL SLICKS ON LAKE GENEVA

 An EPFL researcher has, for the first time, documented slicks – those visually arresting, moving patches of smooth water – and explained what is happening beneath the surface.



WHY RIVERS MATTER FOR THE GLOBAL CARBON CYCLE

 In a new journal article, EPFL professor Tom Battin reviews our current understanding of carbon fluxes in the world's river networks. He demonstrates their central role in the global carbon cycle and argues for the creation of a global River Observation System.



Learn more



NEW MAPS CHART OUR AFFECTIVE RELATIONSHIP WITH THE LOCAL ENVIRONMENT

EPFL researchers have studied Vernier, a city in the canton of Geneva, as the pilot site for an interactive map that explores our relationship with the built and natural environments.

Learn more



THE 2°C WARMING TARGET REMAINS IN SIGHT

Can the 120 countries that signed the Glasgow Climate Pact keep to the pledges they made for 2100? Researchers at EPFL have developed detailed models for calculating long-term CO₂ emissions-reduction trajectories and analyzing their impact on global warming. Their findings offer a glimmer of hope.

SCIENTISTS IMPROVE THE ACCURACY OF WEATHER AND CLIMATE MODELS

Scientists from EPFL and the WSL Institute for Snow and Avalanche Research SLF have developed a program that improves the accuracy of a widely used weather forecasting model by incorporating surface phenomena that weren't previously taken into account.



CENTRALIZED DATABASE HELPS SCIENTISTS BETTER UNDERSTAND CORAL REEFS

Coral reefs are under a growing threat from climate change and human activity, making it more important than ever to understand their strengths and vulnerabilities. A team of EPFL scientists has now taken an important step in this direction with the new RECIFS open-access database on reef environments.



THE FIRST CLIMATE STRIKES HAD AN INFLUENCE ON SWISS RESIDENTS

A study by EPFL researchers found that Greta Thunberg's Fridays for Future climate strikes have influenced the environmental behavior of Swiss residents.



AI HELPS DETECTING PLASTIC IN OCEANS

A research team from EPFL and Wageningen University has developed a new artificial intelligence model that recognises floating plastics much more accurately in satellite images than before. This could help to systematically remove plastic litter from the oceans with ships.

Scientists gain insight into geothermal-technology induced seismicity

Author: Rebecca Mosimann
Photo: iStock

EPFL scientists have developed a model that sheds light on the seismic risks arising from subsurface fluid injections carried out as part of geothermal energy extraction.

To support the shift to a carbon-free economy, energy producers are eagerly looking for ways to safely extract geothermal energy from deep underground. EPFL associate professor Brice Lecampion, who heads the Laboratory of Geo-energy (GEL) and holds the Gaznat Chair on Geo-Energy at ENAC, is contributing to these efforts through the work being done by his research group. They're developing models for describing the behavior of the subsurface, with a specific focus on the consequences of subsurface fluid injections – that is, how fluid flow interacts with fractures in rocks. Their research is important because underground water injection plays a key role in the extraction of geothermal energy, a renewable source. The scientists' latest findings appear in Proceedings of the Royal Society A and pave the way to a better understanding of the underlying physical mechanisms that trigger seismicity during geothermal operations.

In Switzerland and elsewhere, geothermal wells that run deep underground (4–6 km below the surface) are controversial due to the potential for a seismic event and subsurface pollution. One recent example is the local opposition to plans to build a geothermal power plant in Haute-Sorne, in Jura Canton.

The role of hydraulic stimulation

Geothermal wells that don't run very deep remain in permeable



layers of rock where water circulates easily. But as they get further below the surface, they enter impermeable rock, meaning engineers must either artificially create fractures in the rock where water can flow or stimulate existing fractures to increase their permeability. This is done through a process known as hydraulic stimulation. While this process enhances rock permeability, it also has the potential to trigger earthquakes. That's what happened during a pilot project in Basel in 2006, for example, when fluid-injection operations led to a magnitude 3 earthquake – and the project being abandoned.

Underlying mechanisms of induced seismicity

The risk of an induced earthquake is especially problematic since it doesn't go away once the fluid injection stops, but rather continues for quite some time afterwards. Alexis Sáez, a PhD student at GEL and a co-author of the study, explains: "We looked particularly at earthquakes that occur between a few days and a few months after the end of fluid injection. Our research sheds light on a new physical mechanism that can trigger these delayed earthquakes." He and Lecampion developed

a 3D computer model and ran comprehensive technical analyses of how the fluid injection and fractures interact. They described in great detail how fractures keep deforming after the fluid injection has ended, and how this delayed deformation process may promote the triggering of an earthquake.

"Our model gives engineers guidance and new calculation methods that can be integrated into more general strategies to mitigate the seismic risk associated with these operations," says Sáez. "For now, it's really hard to

predict the occurrence of injection-induced earthquakes – engineers rely mostly on statistical approaches, similar to what they do for natural earthquakes. Our research provides a better understanding of the physical forces at work. This is a step forward in the implementation of physics-based approaches to manage the inherent seismic risk of these operations and to ultimately unlock the vast potential of geothermal energy to facilitate the decarbonization of our energy system."

References

Alexis Sáez and Brice Lecampion, "Post-injection aseismic slip as a mechanism for the delayed triggering of seismicity," Proceedings of the Royal Society A, 24 May 2023.

A summer of intense field-work for the GreenFjord project

Author: Sandrine Perroud
Photo: Lionel Favre

GreenFjord is a four-year research program intended to investigate how climate change is affecting ecosystems in southern Greenland. The scientists completed a first intensive field season where they won over the local residents. The next step will be to analyze the millions of datapoints they collected.

Julia Schmale is no stranger to harsh research environments. She spent significant time in the past ten years either working in a lab on an uninhabited Sub-Antarctic island with polar ocean as far as the eye could see, or on icebreakers as they drifted with Arctic sea ice, always far away from human settlements. That changed in 2022 when she formed a consortium of experts of a research program called “GreenFjord”, led the proposal writing and then won the competition of the Swiss Polar Institute, which appointed her to direct one of its four-year flagship projects.

Southern Greenland is one of the regions most exposed to climate change, yet much remains to be learned about how its ecosystems will react to this exposure. The area is complex owing to its glaciers, series of fjords that spill into the ocean and mountain chains. In addition, the local communities – which subsists on fishing, reindeer herding, agriculture, and tourism, for example – are highly vulnerable to the potential climatic disruptions affecting all aspects of life.

Holistic approach

The GreenFjord project aims to better understand the shifts taking place

in Southern Greenland’s ecosystems. The scientists have adopted a holistic approach that involves measuring atmospheric changes, the local carbon cycle, fjord dynamics, glacier retreat and overall biodiversity. They’re also assessing the societal impact through interviews with the local community. At the heart of the project are two fjord systems, where in one the glaciers terminate in the water, and where in the other the ice has retreated so far that it ends on land.

The latter fjord system is a surrogate for the future.

The project is being carried out through six research clusters with a total of about 50 scientists at around a dozen research centers in Switzerland and abroad. “The effects of climate change are three to four times greater in Greenland than anywhere else in the world,” says Schmale. “We need to understand the processes involved in environmental transformation so that we can better prepare for the consequences, that

is adapt. What happens in this part of the world affects everyone, ultimately.” The research lab she runs is the Ingvar Kamprad Chair of Extreme Environments, and is part of the ALPOLE research center on extreme and polar environments at the campus of EPFL Valais Wallis.

Everyday life

The data-collection phase of the project ramped up between May and September of this year. Around 50 scientists visited the area and were

successful in collecting millions of data points. Schmale arranged with the Narsaq International Research Station (NIRS) located in Narsaq, a village of 1,300 residents, to function as field hub for GreenFjord. A total change of context for her field work. The on-site scientists are housed in the station and other local wooden and colorful houses. They’re immersed in village life, which revolves mainly around farming, a slaughterhouse, fishing, a school and food college, community services, such as a fire station and

transportation logistics. It’s a village where everyone knows each other and greets each other in the streets.

Ocean, land and icebergs

Several research clusters explored the two contrasting fjords by using Greenlandic research vessels, the Adolf Jensen and RV Sanna. They assessed the overall dynamics along with temperature and nutrient variations, the storage of greenhouse gases in the water, such as methane, and fjord biodiversity. They also placed a fiber-optics cable on the ocean floor so that they could “listen to” the marine terminating glacier – that is to document the loss of mass when an iceberg breaks off. To that end, the research group also set up a radar, seismographs and time-lapse cameras amongst other.

Tracking dust

Several clusters collected samples of the soil, water and glacier-fed-stream sediment in collaboration with a team that took detailed measurements of the dust that’s accumulating due to glacier retreat, as part of the Eco-Plains project – an interdisciplinary research project carried out at EPFL’s School of Architecture, Civil and Environmental Engineering (ENAC). Eco-Plains is headed by Schmale along with Iana Altshuler, an EPFL tenure track assistant professor, and Devis Tuia, an EPFL associate professor. “Dust can alter the process of cloud formation and lead to changes in precipitation patterns,” says Schmale. “As dust particles move from the ground to the atmosphere they can act as seeds for ice crystal formation and thereby influence clouds.” The scientists also set up three weather stations – one near the



coast and two further inland – with instruments for collecting air particles, including dust to measure how dust is elevated into the air.

DNA sequencing will be carried out on these field samples collected in GreenFjord, but also on samples taken from the ice, air and water, in order to determine the biodiversity in terms of plants, animals and microorganisms and get a complete picture of the region's biodiversity.

Above the clouds and fog

Schmale and the other scientists didn't go unnoticed by the curious residents of Narsaq, especially when the team deployed one of its key instruments for measuring atmospheric composition – a red and white tethered balloon proudly bearing the EPFL logo. It floated over the village for eight weeks, in near-daily flights that turned into an entertaining show for the villagers. "A young girl from the neighborhood started coming by every morning to help us unwind the balloon's cords and untie the knots so it could fly," says Schmale. The platform is designed to rise above the clouds and fog that are often found in the region owing to its many fjords. Scientists will study the air particles it observed to determine whether the cloud and fog are the result of anthropogenic activity, natural fjord emissions or glacial dust.

Getting to know the local community

This year, the scientists set up a GreenFjord page on Facebook, which is popular in the village. They posted announcements of the tethered-balloon launches and invited Narsaq residents

to attend, as they could also listen to the researchers discuss their work in the region. "People of all ages came to our launches, from schoolchildren to pensioners," says Schmale. "These events helped us earn their trust. I think they were proud their village could host our study. We also ran a contest to select a name for the balloon. The winner was nattoralik, which means 'large white sea eagle' in Greenlandic.

As forest fires spread through Canada in July, the sky over Narsaq darkened under the smoke. Here too, the scientists used their Facebook page to provide helpful information about what was happening and how it was affecting the atmosphere.

Changes in the landscape

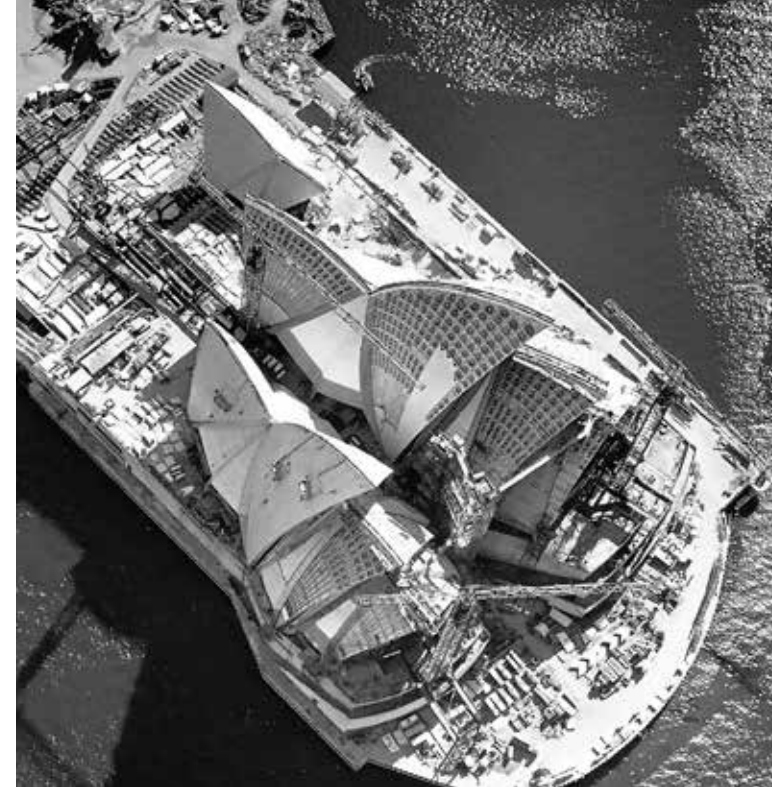
The research group that interviewed the Narsaq residents conducted commented walks, where local residents explain perceptions and historic significance of landscape features. They also held a photo contest where people could send in images depicting what their landscape meant to them and how they saw it changing in the future. "The glacier retreat means there probably won't be many icebergs around anymore one day in the far future, which will completely upend the local landscape's identity," says Schmale.

Data analysis and giving back

Greenland's national newspaper published a long article on GreenFjord this summer. For the scientists, this was important recognition of their field work and a reminder that they have a responsibility to the people of Greenland. The team will

spend the next several years of the project compiling and analyzing the many datapoints they've collected and are yet to produce from laboratory analysis. Later, Schmale and the GreenFjord leadership plan to return to Narsaq to present the main findings of their research. She explains: "Thanks to our interdisciplinary efforts, we'll be able to better assess the impacts of rising temperatures, glacier retreat and changing fjord dynamics on local livelihoods. These data will also give us important insight into how similar fjord regions in the Arctic, e.g. Svalbard might evolve, leading to better scenarios of how the Arctic might develop and might impact climate at a global scale."

Learn more



SYDNEY OPERA HOUSE IS STILL REVEALING ITS SECRETS AS IT TURNS 50

EPFL professor Paolo Tombesi has rewritten an important part of the history of this gem of Australian architecture. Tapping into previously unexplored archives, he found that its distinctive roof – consisting of shells in the form of boat sails – was assembled through a remarkable feat of engineering.

EPFL LAUNCHED A PIONEERING PROJECT TO DETECT POLLEN, DUST AND SMOKE

Since the start of 2023, a suite of instruments has been hard at work detecting a broad spectrum of aerosols at the MeteoSwiss weather station in Payerne (VD). This pioneering project – a joint initiative between EPFL, the Swiss Federal Office of Meteorology Climatology and European partners – aims to improve pollen forecasting and to gain further insights into the critical impact that bioaerosols, smoke and dust have on cloud formation and climate.



SCIENTISTS EXPLORE HIDDEN DYNAMICS IN PEAT UNDER MOSSES AND SHRUBS

Global warming is causing extensive changes to peatland vegetation in Europe and Western Siberia, with consequences for soil composition and the peatlands' ability to sequester carbon. An EPFL-led study has examined the mechanisms behind these complex processes.



Active collaborations with interdisciplinary centers

Interdisciplinary research is a core value at our school. ENAC is involved in the work of various research centers because tackling issues holistically is an important path to innovative new solutions on climate change, digitalization and urbanization.

CENTERS GOVERNED BY ENAC MEMBERS



ALPOLE

The establishment of ALPOLE recognizes the global relevance of changes taking place in high-altitude and high-latitude environments, which are sentinels of climate change.



CLIMACT Center

CLIMACT seeks to promote integrated economic, societal and environmental resilience by developing low-carbon pathways through continuous innovation in societal, ecological and technological systems.



ECOTOX Center

The Swiss Center for Applied Ecotoxicology (Ecotox Center) detects and assesses the environmental effects of chemical compounds and develops strategies for minimizing the associated risks.



Habitat Research Center (HRC)

The Habitat Research Center is a cross-disciplinary research platform designed to explore urban phenomena and outline visions, strategies and projects to address this fundamental topic.



Limnology Center (LIMNC)

The Limnology Center was established to conduct socially relevant, multi-disciplinary research to ensure the sustainable use and conservation of natural water resources at both the national and international levels.



Smart Living Lab

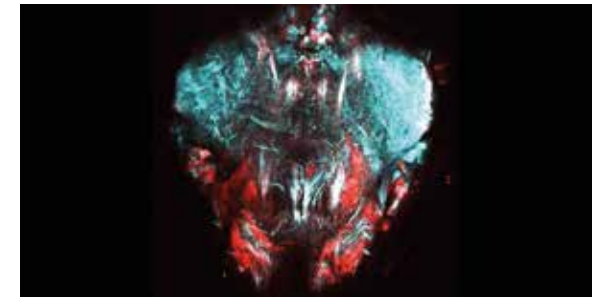
The Smart Living Lab is a research center for the built environment. Its aim is to create technology for achieving energy efficiency, supporting the digital transformation and enhancing the well-being of building occupants.

OTHER CENTERS IN WHICH ENAC RESEARCHERS ARE ACTIVELY INVOLVED



AI Center

AI Center aims to lead the way towards trustworthy, accessible, and inclusive AI through cutting-edge research, education and collaboration with industry and society.



Center for Imaging

The Center for Imaging aims to nurture advanced imaging at EPFL, from development to use. The Center strives to offer the EPFL community the best possible environment for creating and operating innovative imaging technology.



E4S Center

The E4S Center is dedicated to inspiring and activating the transition to a resilient and inclusive economy within planetary boundaries, mindful of the opportunities and challenges raised by scientific and technological change.



EcoCloud Center

EcoCloud is the only university research center of its kind. It promotes eco-friendly smart data through the development of resilient, efficient, secure and trustworthy data platforms.



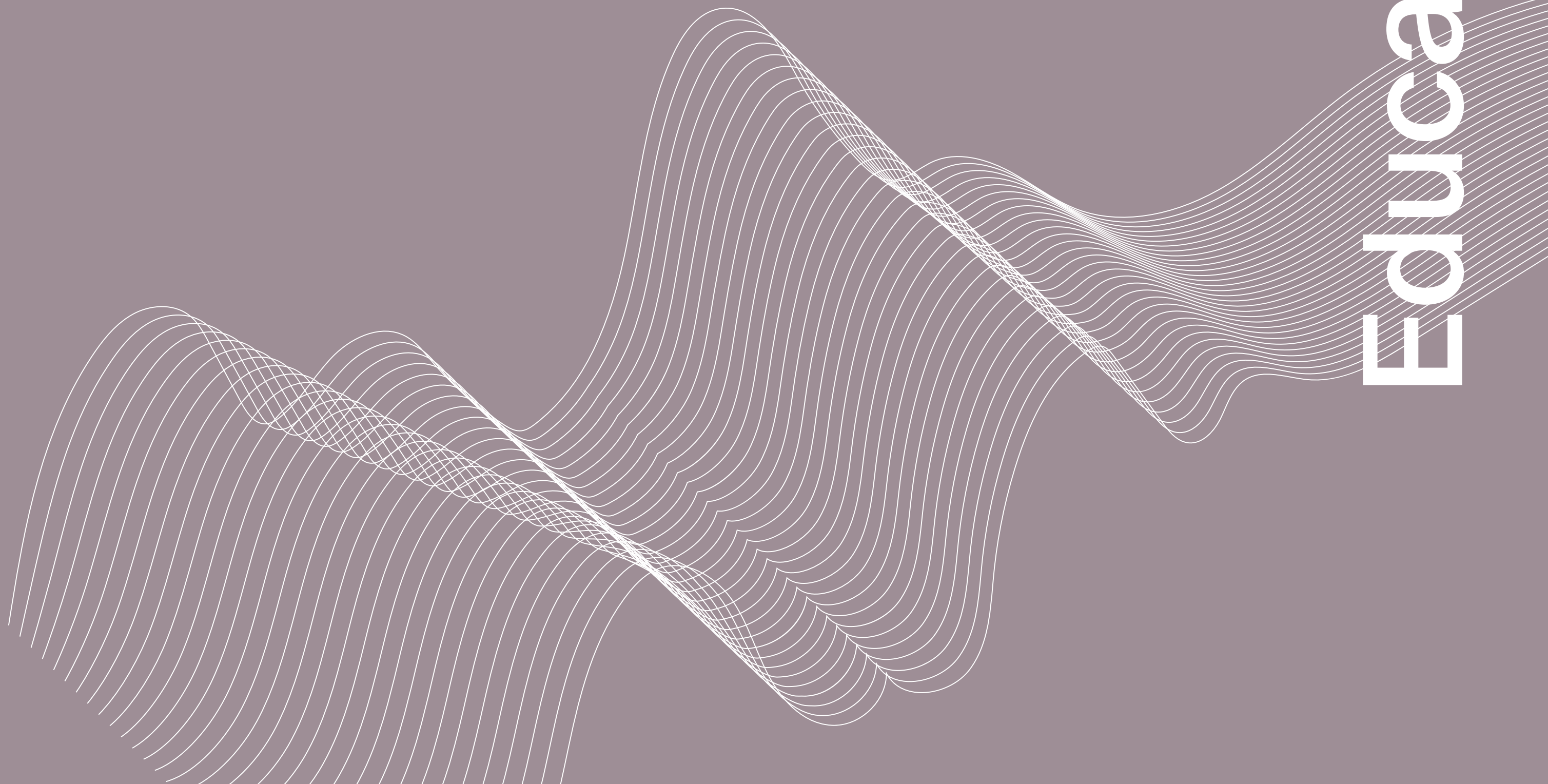
Energy Center (CEN)

The EPFL Energy Center (CEN) promotes EPFL-led energy research by drawing on state-of-the-art technology and addressing society's challenges together, in order to shape tomorrow's energy systems.



Swiss Polar Institute (SPI)

The Swiss Polar Institute (SPI) was created to provide services to and promote synergies within Switzerland's polar community.



Education

How to make an on-demand bus network viable

Author: Sandrine Peiroud
Photo / Video: Marie Geiser

For her EPFL Master's project in civil engineering, Gaëlle Abi Younes examined why on-demand buses have met with only limited success. She used technical and financial models to show how they could become a genuine alternative to cars in outlying areas.

Thanks to the ubiquity of smartphones, we now have a wide range of on-demand services to choose from for traveling short distances: bike-sharing programs, ridesharing, Uber, Lyft and more. But these services are generally centered in urban areas and less available in outlying areas or along main railway lines. The only option for serving people in these areas – and giving them an alternative to personal cars – is to establish a system of on-demand buses. Such systems, few in number, are what Gaëlle Abi Younes decided to focus on for her Master's project.

"I wanted to study a topic that was modern and innovative and that could make a real impact," she says. "On-demand buses checked all those boxes. These buses aren't new, but they've fared poorly in the past because not enough research and modeling had been done on them. There was a big gap in the literature, and that prompted me to look closely at this topic." As an example, Gaëlle Abi Younes points to various pilot projects that were carried out recently in the Lake Geneva area but weren't taken further.

On-demand buses are positioned somewhere between regular large-capacity public buses and personalized services like Uber. Each one can carry 25 to 30 passengers, and their routes are designed to link outlying areas to a public transport network or the closest



urban center. "On-demand buses compete directly with personal cars rather than with conventional public buses," says Abi Younes. "They offer a promising new way for countries like Switzerland to reach net-zero targets for transportation."

Technical and financial modeling

In the first part of her Master's project, she examined existing on-demand bus systems such as Ebuxi, introduced in

Bern four years ago. She also reviewed available studies to get a better idea of the social and economic factors associated with on-demand buses, such as the waiting times that passengers generally deem acceptable and the type of people who might be interested in this type of service. "But what was missing was a comprehensive analysis of how to strike the right balance between cost, waiting time and transport time – even though similar optimization models exist and

are widely used by companies like Uber," says Abi Younes. She therefore developed a model to simulate on-demand bus systems in two different countries – China and Greece – in order to see how the systems could work in cities of different sizes. The simulations let the civil engineer test the equations underlying her hypothesis and determine the conditions required to balance supply and demand. She used those results to describe how the systems could operate and

to quantify how profitable and efficient they could be. "I found that the more people who use these systems, the better they'll work," she says. For the second part of her project, she modeled the financial aspects of on-demand buses based on the same equations. This model was used to examine several scenarios, ranging from how bus operators could maximize their profits to, more realistically, how governments could subsidize on-demand bus systems to achieve

passenger prices and travel times that are competitive with personal vehicles. "Today it would be very expensive to run a pilot project," says Gaëlle Abi Younes. "But with my models, planners could come up with a workable simulation, decide how to best invest their money and predict whether their system would work in practice."

At the crossroads of several disciplines

Abi Younes did her Master's degree in Switzerland after getting her Bachelor's in civil engineering in Lebanon. She now works for TPF, the public transport operator in Fribourg Canton. "Switzerland is a benchmark in public transportation, with many different modes of transport used," she says. "My Master's project was even better than I expected because it gave me exposure to a variety of fields, from traffic-light modeling to transportation economics and sociology." She hopes to have her project findings published in a scientific journal and may soon be able to apply them directly at TPF. The company has long been interested in on-demand buses and tested one last summer at Estavayer-le-Lac.

Watch the video



References

Gaëlle Abi Younes, "On the modelling and analysis of on-demand micro-transit services," Urban Transport Systems Laboratory (LUTS), EPFL. Master's project supervised by PhD student Lynn Fayed, under the direction of Nikolas Geroliminis, EPFL full professor and head of LUTS, 2023.

Trees are not always a miracle cure for improving air quality

Author: Sandrine Perroud
Photo / video: Alain Herzog - Marie Geiser

Donato Kofel has quantified the positive and negative effects of trees on outdoor air quality in Geneva Canton. His method can be used by city planners to design their large-scale planting programs more effectively.

For his EPFL Master's project in environmental sciences and engineering, Donato Kofel delved into the world of geographic information systems (GIS), a type of advanced mapping software. "These maps convey a lot of information in a single image, in a way that lets people grasp it all immediately," he says. For his Master's project at the end of his degree program, Kofel developed a new way to use the GIS application to study how trees in Geneva Canton are affecting the region's air quality. His work formed part of the broader URBTREES study being carried out by three labs at EPFL's School of Architecture, Civil and Environmental Engineering (ENAC): the Extreme Environments Research Laboratory, headed by Julia Schmale; the Plant Ecology Research Laboratory, headed by Charlotte Grossiord; and the Design Studio on the Conception of Space, headed jointly by Dieter Dietz and Daniel Zamarbide.

Positive and negative effects

To conduct his research, Kofel drew on a Geneva Canton tree inventory containing around 240,000 "isolated" trees, or trees located outside of a forest. These can be trees lining a boulevard, for example, or planted in a city park. The isolated trees in the Geneva inventory make up around 25% of the canton's total trees. The inventory lists several tree characteristics

such as the species, location, trunk height, trunk diameter and crown diameter. "I used these data to generate maps of the trees' total leaf area, which in turn gives an indication of their ability to filter out particulate matter from the air," says Kofel. In parallel, he also studied another important process: the trees' role in ozone formation and deposition.

Trees naturally emit biogenic volatile organic compounds (BVOCs) at a rate that depends on factors such as the tree species, air temperature and humidity, amount of sunlight and whether the trees have been damaged or stressed. These BVOCs are then converted into ozone through photochemical oxidation with other compounds in the air that are emitted by human activities – and ozone is known to negatively affect our health and the environment. He estimated the ozone forming potential of the trees' emissions: "I was surprised to find out that trees can also have a detrimental effect on air quality under certain conditions," says Kofel.

A quarter of particulate matter filtered

He began his Master's project by compiling the literature on the 51 most common tree species in Geneva Canton and using this information to calculate their hourly BVOC emission rates. He learns that some species of oak, the type of tree most often found along the canton's streets and in its parks, have some of the highest BVOC emission rates – and therefore the greatest ozone-forming potential – among all species he looked at. Kofel worked with fellow EPFL Master's

student Romana Paganini and scientist Ilann Bourgeois to run the data through the i-Tree Eco model. With this open-source application, they estimated how much particulate matter and ozone is filtered by the trees each year to emphasize the positive effect of urban trees.

Kofel's maps suggest that urban trees removed around 25% of particulate matter produced from anthropogenic activity in Geneva Canton (according to the 2014 emissions assessment for French-speaking Switzerland). He also found that the ozone-forming potential of these trees is around 10 times higher than their ozone-removing potential, and that they emit 130 metric tons of BVOCs per year – equal



to around 18% of the VOCs emitted annually by road traffic. The results show that anthropogenic activities emit enough nitrogen oxides for the right chemical reactions to happen. In other words, there is potential to reduce ozone formation coming from the trees by reducing human emissions of nitrogen oxides depending on the actual mix of BVOCs and nitrogen oxides.

No miracle cure in all conditions

So there's no clear-cut answer to just how good urban trees are for air quality when the combination with anthropogenic emissions can lead to additional air pollution. Kofel believes more in-depth studies are

needed: "There are still some question marks surrounding our estimates, and I'm working to make them more robust. Also we did not take into account the formation potential of particulate matter from BVOCs," he says. "But for now, our findings show that even though trees can make a major contribution to improving urban air quality, they're not a miracle cure in all conditions. The problem of air pollution needs to be tackled at the source by addressing the issue of road traffic and other emission sources." Kofel adds that once he has finalized his calculations, city officials can use his maps to determine which tree species are best suited for public areas in order to improve air quality in neighborhoods with the highest amount of air pollution.

One thing that motivated Kofel during his Master's project was knowing that Geneva Canton officials would be interested in his method and findings – he presented them twice to the air quality and noise pollution office of the canton's environment department. He's also preparing an article based on his Master's thesis for publication in a scientific journal."

Watch the video



Reference

Donato Kofel, URBTREES – Quantifying and mapping the impact of urban trees on air quality in Geneva, Switzerland, Master's project supervised jointly by Ilann Bourgeois and Julia Schmale, EPFL, January 2023.

What will the Grande Dixence region look like 200 years from now?

Author: Rebecca Mosimann
Photo / video: Marie Geiser



An EPFL architecture student explored what the area around the Grande Dixence dam in Valais Canton might look like in 2223, drawing on scientific data to shed light on the long-term implications of environmental change.

For her Master's project, Sarah Planchamp – who recently graduated from EPFL – mapped out a possible future for the area around the Grande Dixence dam, a site that's close to the heart of the people of Valais Canton. She drew on alternative and emerging practices, such as collective thinking and participatory workshops organized by citizens and academic institutions, to imagine what life might be like 100 years from now and beyond. "IPCC reports aren't always easy to follow, and

their predictions don't look past 2100," says Planchamp, who is from Valais. "Some of the infrastructure we have today will still exist beyond that date. I wanted to look further into the future – to broaden our thinking by drawing on both current scientific data and the power of imagination. There's a common saying among local people that if the dam breaks, we'll all be under water. That's why I decided to focus on the dam and the surrounding area, which is interesting for many reasons."

During her time at EPFL's School of Architecture, Civil and Environmental Engineering (ENAC), which actively encourages students to develop interdisciplinary skills and knowledge, Planchamp took classes outside her section, in

environmental science and civil engineering. This insight into fields beyond the confines of architecture allowed her to consider the implications of environmental and social change holistically, exploring these long-term phenomena in depth and from new and interesting angles.

Government predictions

Planchamp drew on a range of resources in order to build a credible picture of how the Grande Dixence region could change over the next 200 years. Yet she took the power of human imagination as her starting point. "Our imagination is an incredibly powerful tool," she says. "It's how we build a common narrative, test hypotheses and tease meaning out of things we don't understand." Planchamp also delved into

Based on these data and inputs, Planchamp mapped out a possible future for the area in 2223. Under her scenario, precipitation would be less regular, the climate would be hotter and the tree line would have risen to around 1,000 meters above sea level. Society would be structured differently in order to cope with these new conditions: the population would be the same as today, but the much higher temperatures would render the Rhone valley inhospitable in summer, leading to the revival of transhumance. With the glaciers having melted and rainfall becoming much less dependable, lakes and other bodies of water would be a lifeline for both energy supply and high-altitude agroforestry systems.

Underground gondola lifts

Although the dam itself would withstand the test of time, much would change – including the water level inside the tunnels. These are currently full to the top between April and November each year. Under Planchamp's scenario, the water level would be much lower, allowing local residents to cross the mountain through a new system of underground gondola lifts. Crops would be grown on terraces, which would help retain water-borne sediment, thereby keeping the lakes from silting up while creating the fertile soil needed for agroforestry. Farmers would plant crops that are better able to tolerate the new climate, such as those currently grown in the Andes. The terraces would be strategically located to avoid landslides and the threat of more frequent avalanches. Local residents would live underground, in homes built

directly into the terraces. And, as Planchamp explains, there would be a stronger sense of community than at present: "People would learn to live with the conditions imposed on them by their environment. They would look out for each other and take care of the natural world around them."

"My scenario isn't necessarily the most likely future," concludes Planchamp. "Nor is it a goal to aim for. But it's interesting – and reassuring – to think that low-tech options such as these could make society more resilient. My possible future sets out some ideas we can all get behind as we prepare for what the real future might have in store. This holistic vision of one small community could inspire broader thinking about alternatives to our current way of life."

Watch the video



Reference

"One possible future for Grande Dixence", Sarah Planchamp, supervised by Corentin Fivet, Sarah Nichols and André Ullal, 2023.

Durabilis awards: “There’s room in Swiss agriculture for greater biodiversity”

Author: Emmanuelle Marendaz Colle
Photo: Alain Herzog

2023’s UNIL-EPFL Durabilis Awards went to two Master’s projects addressing sustainability in the food industry. Both winners – Agathe Crosnier (EPFL - SSIE) and Nicolas Bissardon (UNIL) – came up with fresh ideas for producing and consuming food in a more environmentally responsible way.

The two winners – Agathe Crosnier, now a Master’s graduate in environmental science and engineering from EPFL, and Nicolas Bissardon, now a Master’s graduate from the Faculty of Geosciences and the Environment from the University of Lausanne (UNIL) – presented their research findings at the Durabilis Awards ceremony on Thursday, 30 November. These awards were introduced in 2007 to recognize outstanding student projects in the area of sustainability.

Of the 40 students who competed this year, Crosnier stood out for her meticulous approach which, according to the selection panel, provides a solid foundation for the recommendations she makes on how to improve the sustainability of Swiss agriculture. Specifically, Crosnier explored the interactions among different types of diets and farming methods.

Four scenarios for a more sustainable food industry

Food production accounts for 25% of Switzerland’s environmental footprint, while 10% of its greenhouse gas emissions come from farming. To help policymakers shrink these figures, Crosnier outlined four scenarios with different methods for



Nicolas Bissardon and Agathe Crosnier, 2023 Durabilis Awards recipients

producing and consuming food. The goal is to reduce the food industry’s impact on the climate, natural ecosystems, land use and resource depletion – particularly water – by 2050.

Today, 17% of the farmable land in Switzerland is used for organic produce – one of the highest percentages in the world – but 70% of its food-related land use takes place outside the country. Swiss residents eat too much meat and consume too many calories from sugar and oil, with major consequences on both the environment and public health.

The Swiss Federal Office of Public Health has introduced a Swiss Food Pyramid to encourage people to adopt healthier, more sustainable diets. Other dietary guidelines, issued by the EAT-Lancet Commission, suggest consuming fewer dairy products and eating more whole grains, legumes, nuts and seeds. The EAT-Lancet guidelines have a greater

focus on sustainability and aim to provide as healthy a diet as possible while minimizing the environmental impact.

In the first of Crosnier’s four scenarios, Swiss people adopt the Swiss Pyramid, and food continues to be produced as it is today. In the second, Swiss people switch to the EAT-Lancet diet, but no changes are made to how food is produced. In the third, Swiss people adopt the Swiss Pyramid but all food is produced organically. And in the fourth, the EAT-Lancet diet is combined with entirely organic production.

Less meat = lower impact

Crosnier’s findings aren’t as straightforward as you might think. All four scenarios lead to a reduction in the food industry’s environmental impact and are feasible from a land-use perspective. The best scenario in terms of the climate, ecotoxicity and water use is the fourth one (the EAT-Lancet diet coupled

with organic production). However, because organic crops have lower yields – a situation that will change in the future – this scenario would create environmentally harmful externalities, such as with regard to land use. Also, land at high altitudes that’s currently used for pasturing dairy cows can’t be easily converted to other types of farming.

In any case, eating less meat looks like the way to go, and the right approach to food production will involve combining different methods depending on the type of food. Crosnier points out that additional research is needed to quantify the potential of other opportunities like agroecology and regenerative agriculture. “There’s room in Swiss agriculture for greater biodiversity,” she says. She also advocates taking a “true cost accounting” approach to food – one that includes environmental, societal and health-related externalities. To that end, she just started a PhD on this topic, as part

of the True Cost Accounting for Food initiative led by a consortium of organizations including EPFL.

A compass for a “permacircular” economy

Bissardon’s project also examined the issue of food sustainability. He developed a compass consisting of 53 indicators: 17 related specifically to agriculture and 36 broader ones covering production methods, energy use, labor practices and more. He tested his compass at a local cooperative called Le Panier Bio à 2 Roues, which delivers weekly baskets of organic produce grown by the cooperative along with 30 other local farmers within a 50-kilometer radius to 330 households in the Lausanne area. Bissardon’s compass helped the cooperative pinpoint ways of making its operations even more sustainable and better aligned with the principles of regenerative agriculture.

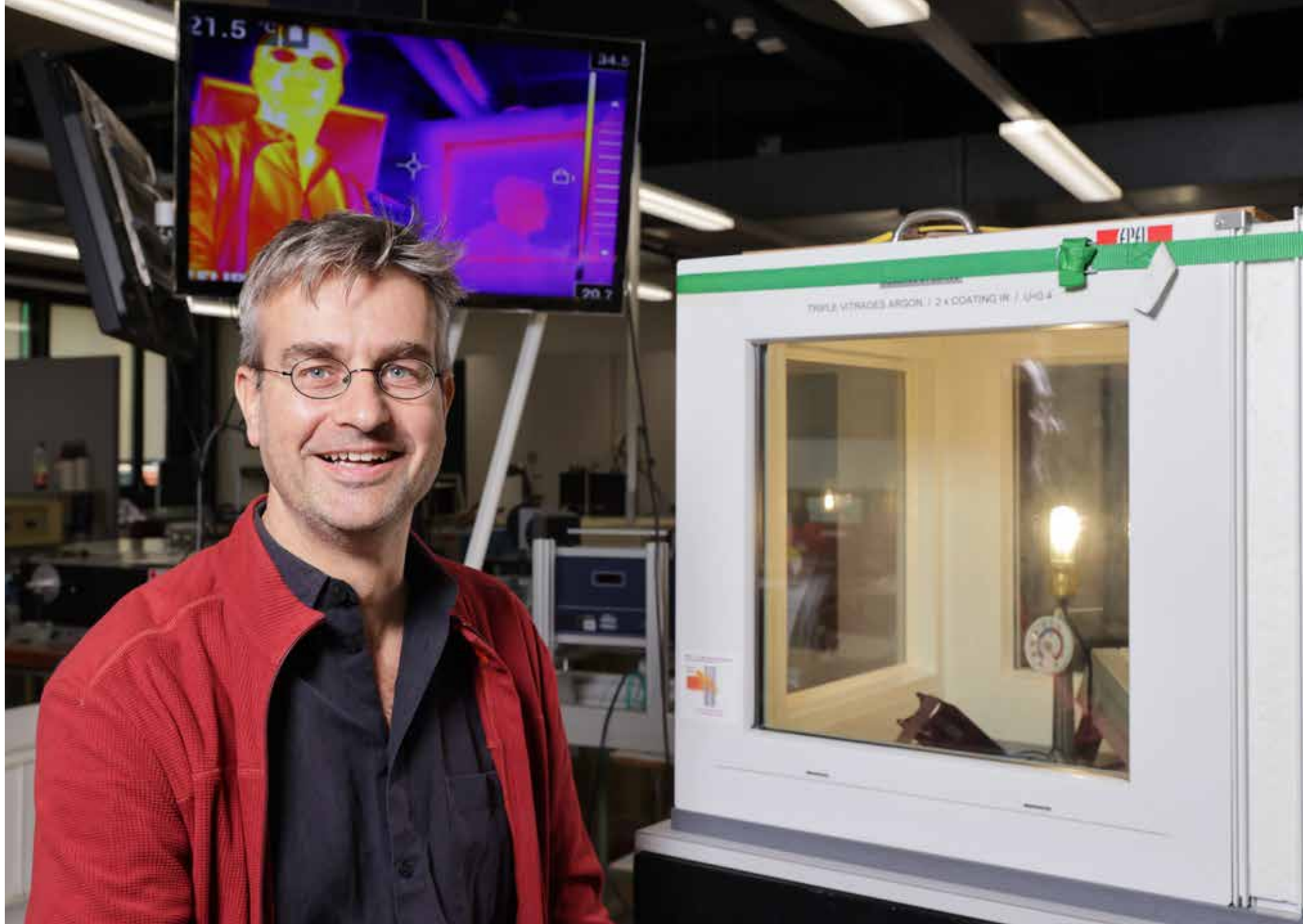
His approach gives farmers a comprehensive view of their impact on the Earth’s planetary boundaries, with a view to promoting an “integral ecology” system. Bissardon thus puts forth a novel method for supporting the transition to a “permacircular” economy – a concept developed by Dominique Bourg and Christian Arnsperger at the University of Lausanne. The Durabilis Awards selection panel noted that “Bissardon’s research provides a handy framework for organizations to assess their sustainability efforts across several areas and at several scales.” His easy-to-use compass can help various types of organizations take concrete steps towards

building a more sustainable world.

As in prior years, the awards ceremony was followed by a convivial raclette meal, but the dried meat traditionally served with the dish was replaced with a selection of vegetables. And it was a zero-waste event: the attendees took home the leftovers, leaving with their stomachs full and their minds nourished.

Physics sheds light on the study of architecture

Author: Rebecca Mosimann
Photo: Alain Herzog



Andreas Schüler, an expert in specialty materials for solar energy conversion, is 2023's winner of both the PolySphère award for best teacher at EPFL's School of Architecture, Civil and Environmental Engineering (ENAC) and the PolySphère d'Or award for best teacher at EPFL. The awards are given out by EPFL students, who selected Schüler for his outstanding teaching in his Building Physics class.

Sometimes, people discover their vocations in the strangest places. That's what happened with Schüler, who stumbled upon his love of technology in the middle of

a forest. He was in primary school, and his teacher – who had decided to hold the class outdoors – asked him to dismantle two old telephones and then link them together. This hands-on experience with turning sounds into electronic signals was the starting point in a long career of studying physics phenomena, which he now teaches at EPFL.

Today, Schüler, originally from Krefeld, Germany, teaches a class in building physics for Bachelor's and Master's students in architecture. The two PolySphère awards he won are handed out by AGEPoly, EPFL's general

student association. The PolySphère d'Or award recognizes excellence in teaching across the entire university, while the ENAC award is specific to that school – where Schüler has been working for 22 years. His students commended his “listening skills and personal investment.” “This is the best honor I could've received at EPFL because it comes directly from the young men and women I teach,” says Schüler. He draws an analogy with an aspect of building physics: “It's really hard to find the right temperature for a given room, since each occupant's perceptions and preferences will be different.

creativity about science while gradually introducing more technical language. And for that, I've got to understand what they need,” says Schüler. “I also try to convey the message that if they have a good understanding of the mechanisms of physics, they can design buildings that are more energy-efficient and more comfortable for occupants. What's more, if architects take these factors into account from the start of a project, they can make better choices in the early stages.” Schüler spent a number of years studying new breakthroughs in materials and technology – especially in the areas of acoustics, insulation, lighting and energy efficiency – while he was a researcher at EPFL's Solar Energy and Building Physics Laboratory, headed by Prof. Jean-Louis Scartezzini.

Faith in clean energy

Schüler now heads ENAC's research group on nanotechnology for solar energy conversion. But he's always been one of those who believes firmly in the potential of clean energy. He obtained a Bachelor's degree from the University of Freiburg in Germany and a Master's degree from the University of Michigan in the US. He then returned to Europe to do a PhD at the University of Basel, where his research looked at the use of nanomaterials in coatings to make them capable of absorbing solar energy. “That was back in 1996, and people thought we were dreaming when we said that solar energy could one day become a viable power source,” he says. “And now, solar energy makes up over 6% of Switzerland's energy mix.” Schüler's other research topics include the optical and

electrical properties of thin films. “While it's important to boost the yields of these materials, we also need to think about how sustainable their components are.”

Schüler is part of a multicultural, creative research group and has thrived in the “international and inspiring atmosphere” at EPFL. He came to the university after a stint in Paris to learn French. In his early days at EPFL, when not at the lab, Schüler would compose world music and play it with his peers – fellow amateur musicians from a variety of countries. “It's the best way for people to form bonds,” he says, drawing a parallel with teaching, which he's now proud to be able to do in French.

«Projeter Ensemble» unites students out in the field

Author: Marina Nicollier
Photos: ENAC communication

One of the central elements of ENAC's educational initiatives is the interdisciplinary Projeter Ensemble program, which provides students from the school's three sections the opportunity to work alongside one another towards a common goal. The program offers a wide variety of courses, workshops, and project experiences for students at the bachelors and masters level that enables them to better understand the impact of interdisciplinary collaboration.

In the spring semester of 2023, over 300 ENAC students in the 2nd year of their bachelor studies participated in an intensive week of project-based learning, the ENAC Week. They were able to select from a range of themes taught by interdisciplinary teaching teams composed of civil engineers, architects, environmental scientists and engineers as well as experts from other domains.

During one of the 12 ENAC Weeks offered this year, "Living in Emergency", students were tasked with designing a habitable refugee camp by building a shelter and sanitation system using a kit of materials similar to those distributed in humanitarian emergencies. The teaching team consisted of experts in the fields of sociology, architecture, environmental engineering, and humanitarian response, who led the students as they developed their projects on site at the EPFL campus in Fribourg.

ENAC students in the 3rd year of their bachelor program participated in one of 11 Teaching units proposed by the Projeter Ensemble program. The course "Ludic

Streets", new in 2023, applied an interdisciplinary approach to the design of urban public spaces for children. Throughout the semester, the students were supported by a team of experts in the domains of mobility, landscape, architecture, sociology, and pedagogy. A significant element of the course was a prototyping phase that enabled the students to integrate a constructive and material dimension to the project.

Many students pursuing their masters degrees at ENAC participated in Projeter Ensemble Summer

Workshops, where the topics ranged from the design-build of a textile-reinforced concrete pavilion to the participation in a construction site emphasizing re-used and bio sourced materials. Others worked individually or in smaller groups on semester-long interdisciplinary projects under the guidance of ENAC professors, further enhancing their particular knowledge base.

2023 was a productive year for Projeter Ensemble, reflecting the uniquely collaborative structure of the ENAC school.



Student Creativity and Innovation Laboratory (SKIL)

Author: Samuel Cotture
Photos: SKIL

In 2023, over 3,000 students took advantage of EPFL's SKIL and SPOT prototyping facilities – a figure that's been growing year after year as students discover the benefits of project-based learning for acquiring cross-disciplinary and transferrable skills.

At ENAC, our students can earn credits for the projects they do at SKIL. In a class given by the ENAC Teaching Unit, for example, students spend one afternoon a week in the makerspace throughout the spring semester. Around 30 students took part in this initiative again last year, working on projects to develop their creative thinking skills in a variety of applications:

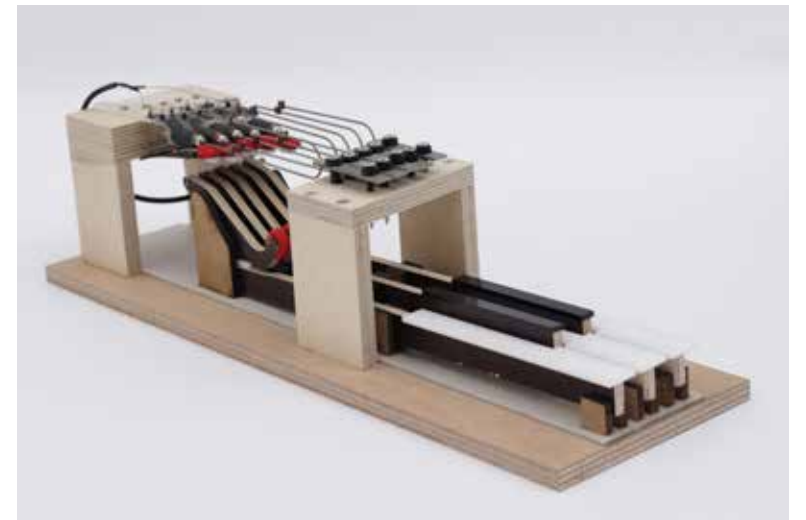
- cooking, by building a wood-fired pizza oven
- music, by creating a piano with high-precision tuning forks
- sports, by developing a multi-purpose crankset for the Sailowtech MAKE project and a cargo bike for carrying palettes
- clothing, by designing an adjustable shoe.

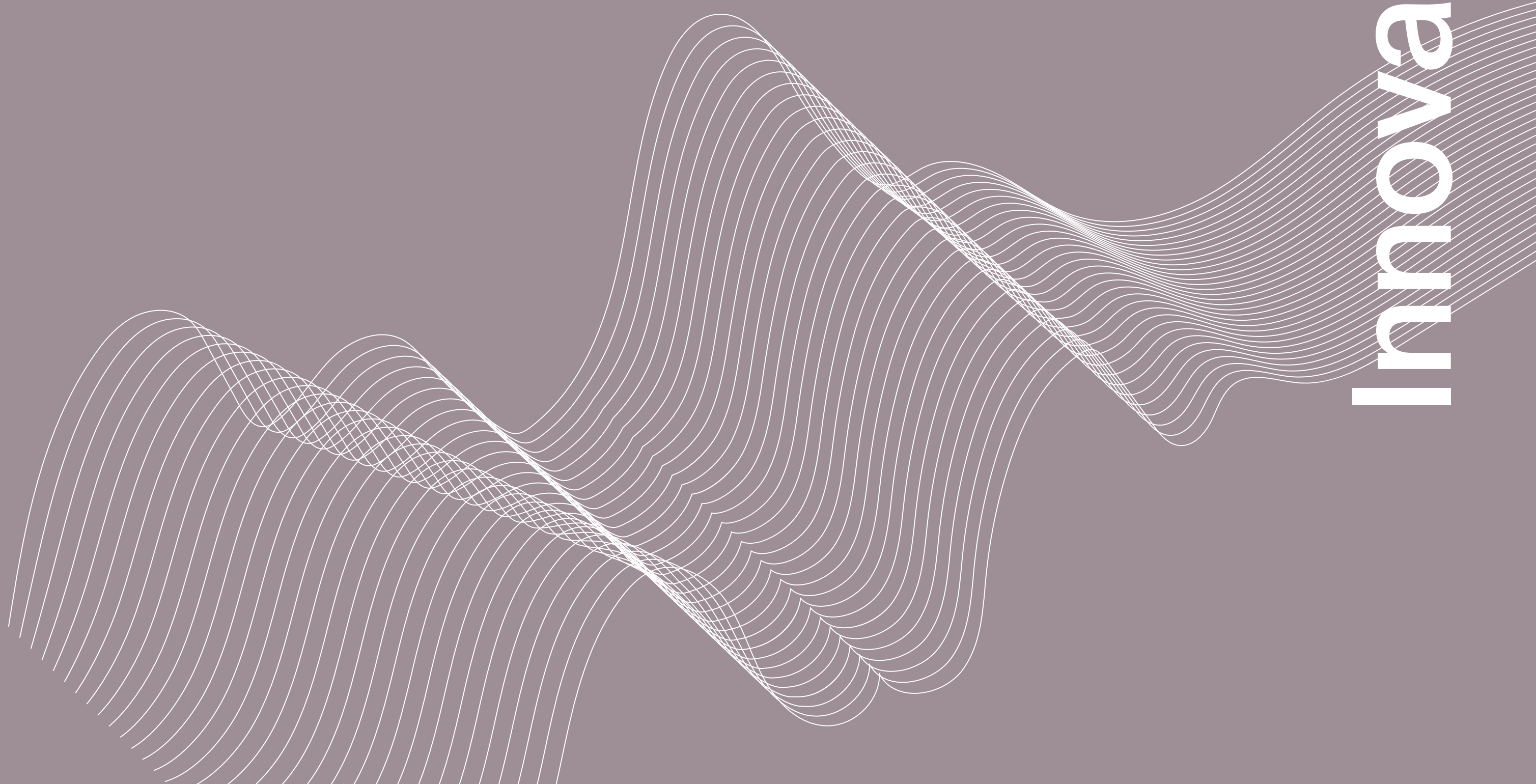
In 2023, we once again saw a great deal of interest from ENAC students for low-tech approaches, for both their



class projects and their activities in student clubs. The term "low-tech" is used widely but it generally refers to design methods whereby engineers carefully select the technical features of a product based on users' concrete needs, the product's

impact over its entire life cycle, and how affordable and easy it would be to obtain. Our staff at SKIL are delighted to be able to guide students in these projects by serving as coaches and mentors and supporting their exceptional efforts.





Innovation

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Sunaxer develops high performance solar absorber coatings for industrial heat harvesting

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Sunaxer receivers boost the efficiency of any concentrating solar collector

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2023 ENAC Trans-disciplinary Cluster Grants winners

The general mission of this grants was to provide seed money for researchers who want to launch and engage in transdisciplinary research projects and to explore new and original ideas linked to ENAC's strategic areas: Climate change, Digitalization and Sustainable Urbanization. The grants serve to explore, initiate, and/or participate in new types of collaborations with non-academic stakeholders (governmental, NGOs, and/or the private sector), with the idea of developing larger projects in the future.



PLURIELLES

The territory as interface in the co-production of urban intelligences.

- PIs: Lucía Yalon (ALICE/IA)
- Partner: Ville de vernier (GE) & Curatrice indépendante
- Start date: 01.01.2023
- Duration: 12 months



SeABeMoL

Seasonal activities between mountains and lakes.

- PI: Florian Masse (LASUR/IA)
- Partner: DGMR, Canton de Vaud
- Start date: 01.02.2023
- Duration: 12 months



PublicSchoolyards

Schoolyards as Public Spaces: the role of design characteristics in the mutualization of teenage schoolyards.

- PIs: Sonia Curnier (LASUR/IA)
- Partner: Association "Ville en Tête"
- Start date: 01.05.2023
- Duration: 12 months



BioSoilStock

Quantifying soil organic matter formation under microbial consortia amendments.

- PIs: Meret Aeppli (SOIL/III E)
- Partner: YpHen SAS
- Start date: 01.04.2023
- Duration: 12 months

2023 ENAC Innovation Seed Grants winners

Our Innovation Seed Grants were a unique opportunity for ENAC scientists and engineers to obtain funding (up to CHF 20,000) so that they can explore innovative ideas early on in the development process. These grants were intended to support innovation and technology transfer at our school and encourage researchers to think across boundaries and design holistic, sustainable, inventive solutions to critical societal problems. The grants were open to ENAC PhD students, postdocs and other researchers who are in the initial phase of developing an application, product or service with a real societal impact.



RUMENFLOR

Artificial rumen to convert brewer's spent grain into next-generation prebiotics for livestock feed.

- PI: Nhat-Tan Vuong (GR-LUD / III E)
- Start date: 1 June 2023
- Duration: 3 months



SafeShore

Sustainable seashore protection.

- PI: Tara Habibi (CCLab/ IIC)
- Start date: November 2023
- Duration: 6 months



WISE

Video-based Inhalation exposure and environmental Satisfaction Estimation in buildings.

- Bowen Du (HOBEL/ IIC)
- Start date: 1 May 2023
- Duration: 6 months



AVIA

Automated visual impact assesment

- Adam Swietek (LEURE/ IA)
- Start date: 1 December 2023
- Duration: 6 months

FUSTIC association: collective intelligence is the key to successful innovation

Author: Frédéric Dreyer
Photos: ENAC communication

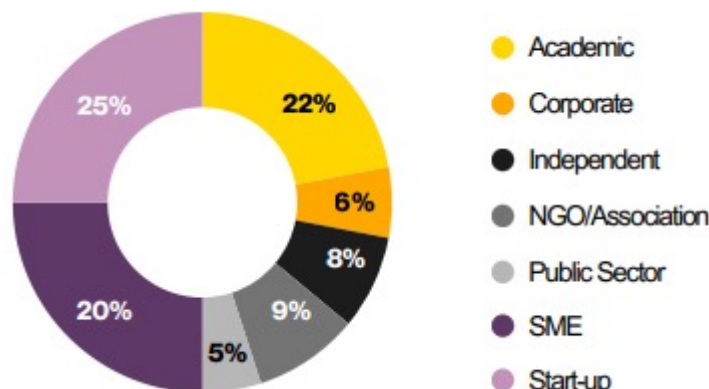
FUSTIC is an independent association founded in 2021 by EPFL and ENAC to promote the societal and ecological transition in digital technology and sustainable cities, regions and infrastructure. Several ENAC laboratories, centers and start-ups are members and actively involved in FUSTIC's activities.

At FUSTIC, we have a vision: building bridges and breaking silos to foster sustainable, multi-stakeholder projects that positively impact cities and territories. We aim to enhance the «town square», maintaining our Human in the Loop approach, and develop a unique collaborative tool to meet the needs of our stakeholders. This involves matching solution seekers with providers, understanding timelines and challenges, embedding research within society, forming teams around open calls, and aggregating information and knowledge.

In 2023, our united efforts have resulted in over thirty significant initiatives and active involvement in many national and international events.

During this year, FUSTIC has continued to work in its 3 main strategic directions :

1. Raising Awareness and Building Community



Key distribution of member categories of FUSTIC, the three most represented sectors are construction, energy, and mobility.



FUSTIC offers a unifying ecosystem of change agents from the public and private sectors, academia, NGOs, associations, regulatory bodies, and the general public. Since our first General Meeting 141 members have joined FUSTIC.

One FUSTIC initiative for 2023 was the FUSTIC Open Innovation Day: a one-day conference focused on open science and innovation in sustainability projects. The FUSTIC Association brought together members and representatives from various sectors and encouraged discussions and collaborations among academics, industries, startups, and cities, all working towards a more sustainable future. The Open Innovation Day consisted of two main parts: the morning session with presentations and roundtables discussing Open Science

and Open Innovation with active participation from the audience and the afternoon with interactive and hands-on workshops, showcases, startup pitches, and exhibitions.

It was an inspiring event with passionate debates and wide-ranging perspectives on open innovation among participants from Switzerland and beyond!

2. Fostering Collaborative Projects

FUSTIC aims to connect members to foster sustainable territories, infrastructure, and city projects through shared experiences and expertise. By bridging the gap between academia and the public and private sectors, we encourage collaboration and the exchange of solutions, ideas, and experiences. This collective learning and cooperation aim to drive the creation of sustainability projects.

A collaborative project, mandated by canton of Geneva, aimed to pinpoint open issues, major challenges, and actionable recommendations for implementing an Urban Digital Twin. Three open-source deliverables were achieved through a comprehensive literature review and an exploratory analysis of cutting-

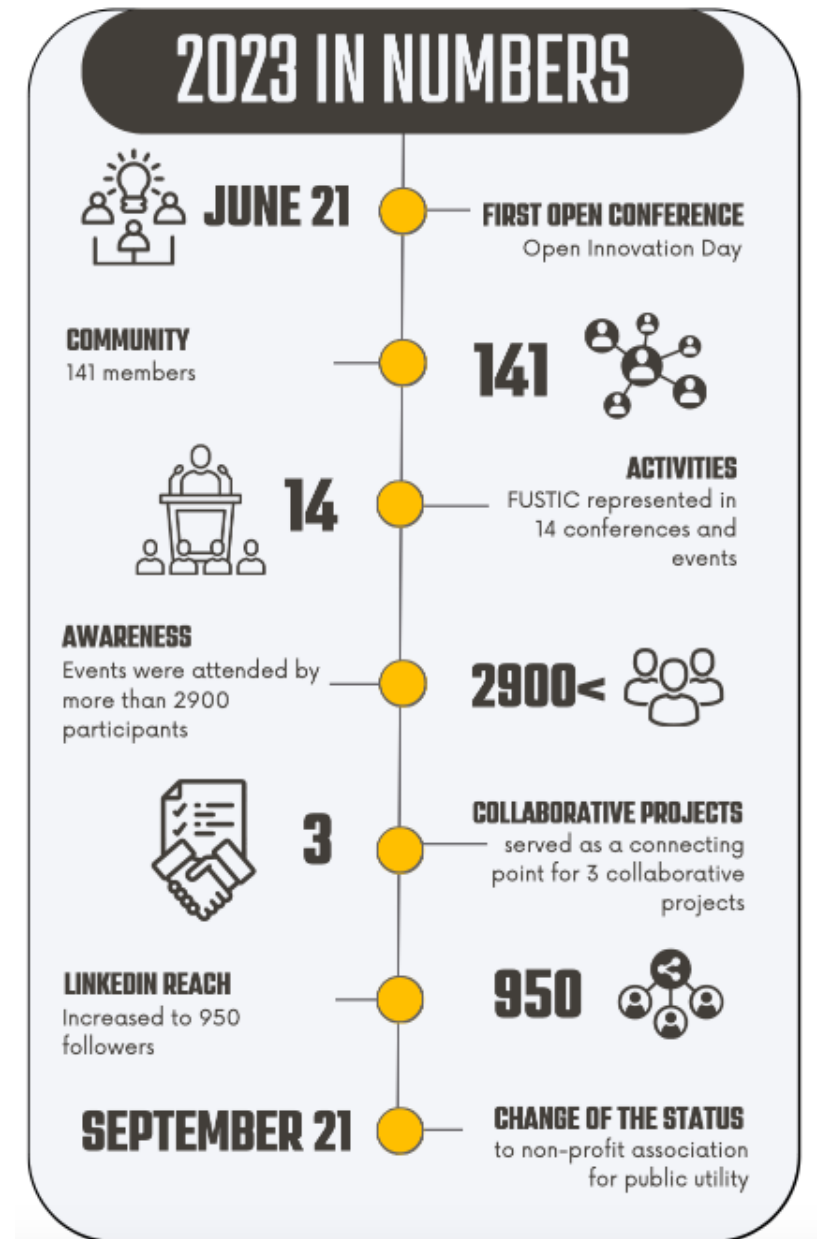
edge solutions. FUSTIC played a pivotal role as the project's main contact and coordinator, outlining deliverables, fostering collaboration with academics, and conducting numerous interviews with officials from the Geneva cantonal administration.

On August 25, 2023, FUSTIC facilitated an informative webinar. During the session, the Service of Economic Promotion and Innovation (SPEI) of Vaud shared information regarding the financial aid available for collaborative projects focused on sustainability: sustainable construction and circular economy.

One concrete output of the Viva Vaud funds webinar was a project between three FUSTIC members: Phida Group, Bridgology & SwissInspect. This innovative project combines cutting-edge technology with the pressing need for sustainability in the construction sector. Our member, PHIDA, a leader in building envelope solutions in French-speaking Switzerland, is seeking funding for a promising collaboration with two Vaud-based companies specializing in the acquisition and analysis of structural images: Bridgology and SwissInspect. This initiative aims to detect thermal losses, roof leaks, and contaminations of underlying concrete structures, all of which impact the building's lifespan, energy efficiency, and environmental preservation.

3. Expanding the network within Switzerland and Internationally

FUSTIC is an inclusive connector and catalyst to embrace global societal, technological, and business



challenges to bring sustainability to territories, infrastructure, and cities.

As an example, FUSTIC was the official partner at the Swissnex in San Francisco anniversary celebration event: «Reimagining Living Within Our Planet's Limits». It was a remarkable gathering of thought leaders and innovators who are committed to shaping a sustainable future for all. We explored innovative strategies and solutions to build a world where human existence coexists harmoniously with the environment. From redefining

our approach to construction to addressing global challenges, it was an inspiring discussion.

Reimagining Living: Building within our Planet's Limits - Swissnex.



www.fustic.org



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EPFL Open Doors 2023

Over 25,000 people attended the Open Days on April 29 and 30, to discover the captivating and exciting world of EPFL through exhibitions, animations, conferences, workshops and many other events.

In the SG building, the three sections of ENAC joined forces to welcome visitors at a large stand animated by students. This booth vividly illustrated our interdisciplinary approach to education, where the interactions between our three disciplines are emphasized to train futur professionals capable of addressing the complex challenges of the future.

The SG building also hosted a large exhibition featuring 40 ENAC laboratories and research centers. This exhibition was organized into four thematic zones, each exploring a crucial aspect of research around climate change:

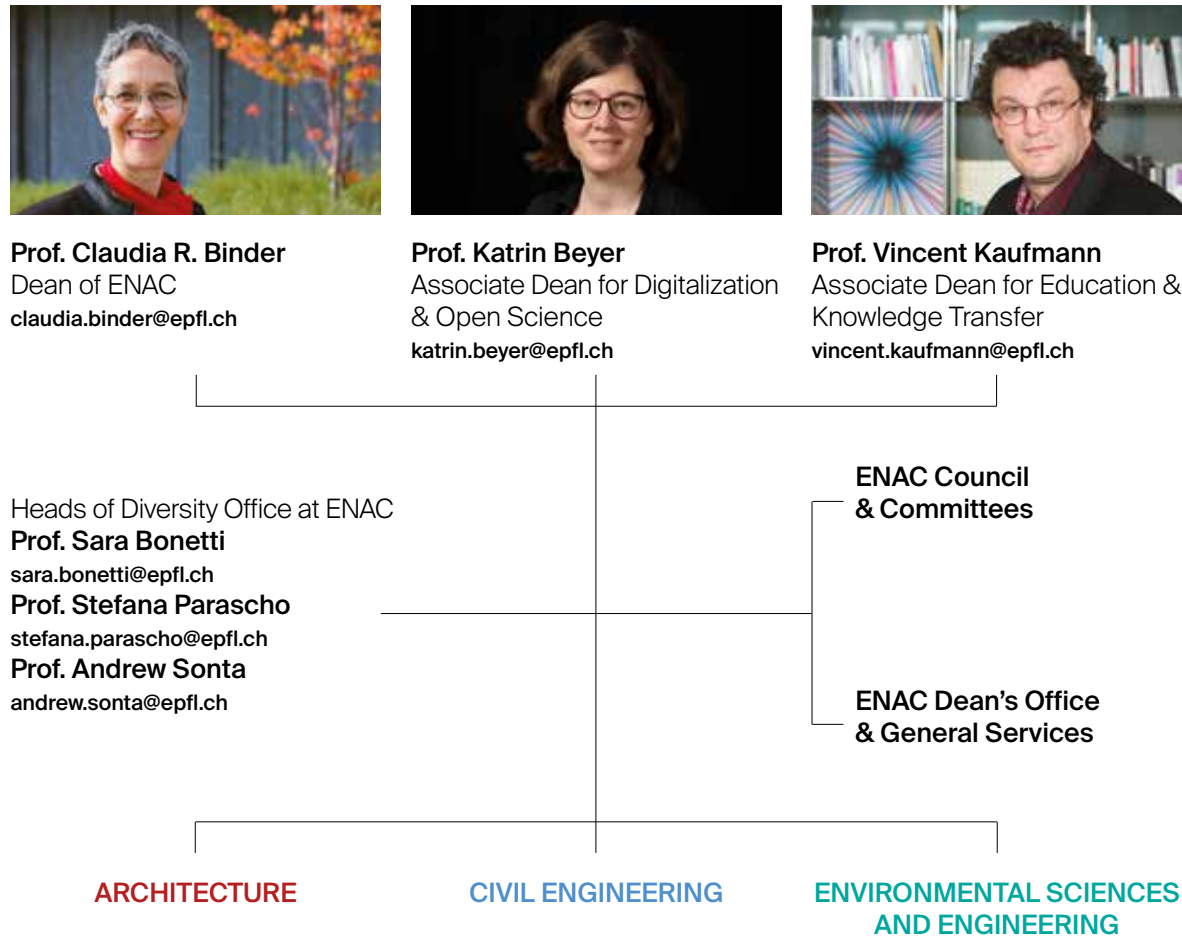
- Renewable Energies and Towards Net-Zero Emissions
- Sustainable Construction
- Transforming Cities and Territory
- Protection and Management of Natural Resources

The Rolex Learning Center hosted two photographic exhibitions that captivated visitors with the beauty and fragility of natural ecosystems. These exhibitions showcased the fieldwork conducted by our researchers on corals and glaciers around the world. The images testified to the tangible effects of climate change on these critical environments and the importance of ongoing research to preserve them.




Alongside the exhibitions, several ENAC professors held thematic conferences, engaging in direct dialogue with visitors on various topics. These exchanges deepened the understanding of current issues and the innovative solutions developed by ENAC teams.

The success of this Open Doors Weekend would not have been possible without the exceptional commitment of over 200 ENAC staff members. Their dedication to promoting and presenting our school's activities was exemplary, and we would like to extend our heartfelt thanks for their contribution.








Institutes

 Prof. Jeffrey Huang Director of the Institute of Architecture and the City (IA) jeffrey.huang@epfl.ch	 Prof. Dimitrios Lignos Director of the Civil Engineering Institute (IIC) dimitrios.lignos@epfl.ch	 Prof. Tamar Kohn Director of the Environmental Engineering Institute (IIE) tamar.kohn@epfl.ch
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Sections

















 Prof. Dieter Dietz Director of the Architecture Section (SAR) dieter.dietz@epfl.ch	 Prof. Brice Lecampion Director of the Civil Engineering Section (SGC) brice.lecampion@epfl.ch	 Prof. Alexis Berne Director of the Environmental Sciences & Engineering Section (SSIE) alexis.berne@epfl.ch
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ENAC's Labs and Research Platforms
















active in 2023

Lab acronym and web link	Lab name	Head	Institute	Location	Change in 2023
ACHT acht.epfl.ch	Architecture, Criticism, History and Theory	van Gerrewey Christophe	IA	Lausanne	
ALICE alice.epfl.ch	Design Studio on the Conception of Space	Dietz Dieter	IA	Lausanne	
BUILD-O building2050.epfl.ch	Building 2050	Aguacil Sergi	IA	Fribourg	
CCLAB cclab.epfl.ch	Composite Construction Laboratory	Keller Thomas	IIC	Lausanne	
CEAT ceat.epfl.ch	Urban and Regional Planning Community	Chenal Jérôme	IIE	Lausanne	
CHANGE change.epfl.ch	Laboratory of Catchment Hydrology and Geomorphology	Bonetti Sara	IIE	Sion	
CNPA cnpa.epfl.ch	Laboratory of Digital Culture for Architectural Projects	Cache Bernard	IA	Lausanne	closed
CONSTRUCT construct.epfl.ch	Concrete Behaviour and Structural Design Laboratory	Ruggiero David	IIC	Lausanne	
CRCL crcl.epfl.ch	Laboratory for Creative Computation	Parascho Stefana	IA	Lausanne	
CRYOS cryos.epfl.ch	Laboratory of Cryospheric Sciences	Lehning Michael	IIE	Sion	
DC-LAB dc-lab.epfl.ch	Domestic City laboratory	Delhay Sophie	IA	Lausanne	opened
DISAL disal.epfl.ch	Distributed Intelligent Systems and Algorithms Laboratory	Martinoli Alcherio	IIE	Lausanne	
EAST-CO east.epfl.ch	Laboratory of Elementary Architecture and Studies of Types	Fröhlich Anja and Fröhlich Martin	IA	Lausanne	
ECEO eceo.epfl.ch	Environmental Computational Science and Earth Observation Laboratory	Tuia Devis	IIE	Sion	
ECHO echo.epfl.ch	Laboratory of Ecohydrology	Rinaldo Andrea	IIE	Lausanne	
ECOL ecol.epfl.ch	Ecological Engineering Laboratory	Barry D. Andrew	IIE	Lausanne	closed

Lab acronym and web link	Lab name	Head	Institute	Location	Change in 2023
EERL eerl.epfl.ch	Extreme Environments Research Laboratory - Ingvar Kamprad Chair	Schmale Julia 	IIE	Sion	
EESD eesd.epfl.ch	Earthquake Engineering and Structural Dynamics Laboratory	Beyer Katrin 	IIC	Lausanne	
EML eml.epfl.ch	Environmental Microbiology Laboratory	Bernier-Latmani Rizlan 	IIE	Lausanne	
ETHOS ethos.epfl.ch	Civil Engineering and Technology for Human Oriented Sustainability Lab	Sonta Andrew 	IIC	Fribourg	
FAR far.epfl.ch	Laboratory of Construction and Architecture	Tombesi Paolo 	IA	Lausanne	
GEL gel.epfl.ch	Geo-energy Laboratory - Gaznat Chair on Geo-energy	Lecampion Brice 	IIC	Lausanne	
GR-ACM acm.epfl.ch	Les Archives de la construction moderne	Aprea Salvatore 	IA	Lausanne	
GR-CEL cel.epfl.ch	Central Environmental Laboratory	Breider Florian 	IIE	Lausanne	
GR-LUD psi.ch/en/cpm	Ludwig Group	Ludwig Christian 	IIE	Lausanne	
GR-URBDEMO urbdemo.epfl.ch	Urban Demography	Lerch Mathias 	IA	Lausanne	
HERUS herus.epfl.ch	Laboratory on Human-Environment Relations in Urban Systems	Binder Claudia R. 	IIE	Lausanne	
HITAM hitam.epfl.ch	History and Theories of Architecture, Technology and Media	Thiermann Alfredo 	IA	Lausanne	
HOBEL hobel.epfl.ch	Human-Oriented Built Environment Lab	Licina Dusan 	IIC	Fribourg	
HOMES homes.epfl.ch	Laboratory for Human-Oriented Mobility Eco-system	Kenan Zhang 	IIC	Lausanne	opened
IBETON ibeton.epfl.ch	Structural Concrete Laboratory	Muttoni Aurelio 	IIC	Lausanne	
IBOIS ibois.epfl.ch	Chair of Timber Construction	Weinand Yves 	IIC	Lausanne	

Lab acronym and web link	Lab name	Head	Institute	Location	Change in 2023
ICE ice.epfl.ch	Laboratory of Integrated Comfort Engineering	Khovalyg Dolaana 	IIC	Fribourg	
IMOS imos.epfl.ch	Intelligent Maintenance and Operations Systems	Fink Olga 	IIC	Lausanne	
LAB-U lab-u.epfl.ch	Laboratory of Urbanism	Viganò Paola 	IA	Lausanne	
LAND land.epfl.ch	Laboratory of Landscape Development	Jessel Beate 	IA	Lausanne	opened
LAPI lapi.epfl.ch	Laboratory of Atmospheric Processes and their Impacts	Nenes Athanasios 	IIE	Lausanne	
LAPIS lapis.epfl.ch	Arts of Sciences Laboratory - Archives of imaginary	Braghieri Nicola 	IA	Lausanne	
LASIG lasig.epfl.ch	Geographic Information Systems Laboratory	Golay François 	IIE	Lausanne	closed
LAST last.epfl.ch	Laboratory of Architecture and Sustainable Technologies	Rey Emmanuel 	IA	Lausanne	
LASUR lasur.epfl.ch	Urban Sociology Laboratory	Kaufmann Vincent 	IA	Lausanne	
LBE lbe.epfl.ch	Laboratory for Environmental Biotechnology	Holliger Christof 	IIE	Lausanne	
LDM ldm.epfl.ch	Media and Design Laboratory (ENAC/IC)	Huang Jeffrey 	IA	Lausanne	
LEMUR lemr.epfl.ch	Laboratory of Experimental Rock Mechanics	Violay Marie 	IIC	Lausanne	
LEURE leure.epfl.ch	Laboratory of Environmental and Urban Economics	Thalmann Philippe 	IA	Lausanne	
LEV lev.epfl.ch	Laboratory of environmental virology	Kohn Tamar 	IIE	Lausanne	
LGB lgb.epfl.ch	Laboratory for Biological Geochemistry	Meibom Anders 	IIE	Lausanne	
LHE lhe.epfl.ch	Environmental Hydraulics Laboratory	Ancey Christophe 	IIC	Lausanne	

Lab acronym and web link	Lab name	Head	Institute	Location	Change in 2023
LIF lif.epfl.ch	Laboratory of Imagination and Fabrication	Taillieu Jo 	IA	Lausanne	
LIPID lipid.epfl.ch	Laboratory of Integrated Performance in Design	Andersen Marilyne 	IA	Lausanne	
LMS lms.epfl.ch	Soil Mechanics Laboratory - Chair gaz naturel Petrosvibri	Laloui Lyesse 	IIC	Lausanne	
LSMS lsms.epfl.ch	Computational Solid Mechanics Laboratory	Molinari Jean-François 	IIC	Lausanne	
LTE lte.epfl.ch	Environmental Remote Sensing Laboratory	Berne Alexis 	IIE	Lausanne	
LTQE ltqe.epfl.ch	Laboratory for Water Quality and Treatment	Von Gunten Urs 	IIE	Lausanne	
LUTS luts.epfl.ch	Urban Transport Systems Laboratory	Geroliminis Nikolaos 	IIC	Lausanne	
MACE mace.epfl.ch	Microbiome Adaptation to the Changing Environment	Altshuler Ianina 	IIE	Sion	
MANSLAB manslab.epfl.ch	Laboratory for Spatial Manufacturing	Marco Bakker and Alexandre Blanc 	IA	Lausanne	
MCS mcs.epfl.ch	Structural Maintenance and Safety Laboratory	Brühwiler Eugen 	IIC	Lausanne	closed
MICROBE microbe.epfl.ch	Laboratory of microbial physiology and resource Biorecovery	Gu Wenyu 	IIE	Lausanne	opened
PERL perl.epfl.ch	Plant Ecology Research Laboratory	Grossiord Charlotte 	IIE	Lausanne	
PL-LCH lch.epfl.ch	Hydraulic Constructions Platform	Perona Paolo 	IIC	Lausanne	
RESSLAB resslab.epfl.ch	Resilient Steel Structures Laboratory	Lignos Dimitrios 	IIC	Lausanne	
RIOT riot.epfl.ch	Research and Development for Innovation on Architecture, Urban Design and Territory	Malterre-Barthes Charlotte 	IA	Lausanne	
RIVER river.epfl.ch	River Ecosystems Laboratory	Battin Tom 	IIE	Sion	

Lab acronym and web link	Lab name	Head	Institute	Location	Change in 2023
RPGL rpglepfl.ch	Rock Physics and Geofluids Laboratory	Kushnir Alexandra 	IIC	Lausanne	
SENSE sense.epfl.ch	Smart Environmental Sensing in Extreme Environments	Chappellaz Jérôme 	IIE	Sion	
SOIL soil.epfl.ch	Soil Biogeochemistry Laboratory	Aeppli Meret 	IIE	Sion	
SXL sxl.epfl.ch	Structural Exploration Lab	Fivet Corentin 	IA	Fribourg	
TEXAS texas.epfl.ch	Theory and Experience Architecture Studio	Lapierre Eric 	IA	Lausanne	
THEMA thema.epfl.ch	Theory of Environment, Material, and Architecture	Nichols Sarah 	IA	Lausanne	
TOPO topo.epfl.ch	Geodetic Engineering Laboratory	Merminod Bertrand 	IIE	Lausanne	closed
TOX tox.epfl.ch	Laboratory of Environmental Toxicology	Schirmer Kristin 	IIE	Lausanne	closed
TPOD tpod.epfl.ch	Theory and Project of Domestic Space	Aureli Pier Vittorio 	IA	Lausanne	
TRANSP-OR transp-or.epfl.ch	Transportation and Mobility Laboratory	Bierlaire Michel 	IIC	Lausanne	
TSAM tsam.epfl.ch	Laboratory of Techniques and Preservation of Modern Architecture	Graf Franz 	IA	Lausanne	closed
URBES urbes.epfl.ch	Laboratory of Urban and Environmental Systems	Manoli Gabriele 	IA	Lausanne	
VITA vita.epfl.ch	Visual Intelligence for Transportation	Alahi Alexandre 	IIC	Lausanne	
WIRE wire.epfl.ch	Wind Engineering and Renewable Energy Laboratory	Porte Agel Fernando 	IIE	Lausanne	
WR-LAB wr-lab.epfl.ch	Watershed Research Lab	von Freyberg Jana 	IIE	Lausanne	closed

2023 Teaching and Research Awards

Institute of Architecture and the City (IA)

Aureli, Pier Vittorio (TPOD) *RIBA Charles Jencks Award. Jencks Foundation at The Cosmic House and the Royal Institute of British Architects (RIBA).*

Delhay, Sophie (DC-LAB) *Chevalière de l'ordre des Arts et des Lettres. Ministère de la Culture, France.*

Fivet, Corentin; Bastien Masse, Maléna; Brütting, Jan; Küpfer, Célia Marine; Devènes, Julie Rachel (SXL) *Best Research into Practice Paper. Structures journal.*

Fivet, Corentin; Bastien Masse, Maléna; Brütting, Jan; Küpfer, Célia Marine; Devènes, Julie Rachel (SXL) *Green Solutions Award. Construction21.*

Fivet, Corentin; Grangeot, Maxence; Parascho, Stefana (SXL) *Best Poster Award. CISBAT, Lausanne.*

Fivet, Corentin; Warmuth, Jonas; D'Acunto, Pierluigi (SXL) *Hangai Prize. International Association for Shell and Spatial Structures (IASS), Melbourne.*

Galbiati, Giuseppe (TSAM) *Doctoral Program Thesis Distinction. Doctoral Program Architecture and Sciences of the City (EDAR), EPFL.*

Malterre-Barthes, Charlotte (RIOT) *Transfer Architecture Video Award 2023. Transfer - Global Architecture Platform.*

Onifadé, Malcolm (ALICE) *FIT Impact Prize Fondation pour l'innovation technologique, Lausanne.*

Onifadé, Malcolm (ALICE) *IDDEA Prize. Idées de développement durable pour les entreprises d'avenir, Genève.*

Pierson, Clotilde; Andersen, Marilyne; Aarts, Mariëlle P.J. (LIPID) *JBPS Best Paper Prize 2022-2023. Taylor & Francis Group.*

Rey, Emmanuel (LAST) *2023 Roberval Prize official selection. Université de Compiègne, France.*

Tombesi, Paolo (FAR) *Best Paper Award 2022. Frontiers of Architectural Research.*

Valdez Juarez, Ruben Alberto (ALICE) *Dezeen Awards 2023. Dezeen, architecture, interiors and design magazine, London.*

Civil Engineering Institute (IIC)

Alahi, Alexandre (VITA) *AI 2000 Most Influential Scholar Award - Honorable Mention in Computer Vision. Aminer.*

Bijelic Nenad (RESSLAB) *Poster Award. ENAC Research Day, EPFL.*

Brühwiler, Eugen (MCS) *Fazlur R. Khan Lecture Award. IALCCE International Association for Life-Cycle Civil Engineering.*

Brühwiler, Eugen (MCS) *Outstanding Structure Award. EuroStruct - European association on quality control of bridges and Structures.*

Brühwiler, Eugen (MCS) *Best Teacher Award for Civil Engineering Section (SGC). EPFL.*

Fink, Olga (IMOS) *Fellow of the PHM society. PHM society.*

Kushnir, Alexandra (RPGL) *2023 EGU Division Outstanding Early Career Scientist Award. Division of Earth Magnetism and Rock Physics (EMRP), European Geosciences Union.*

Lignos, Dimitrios; Sousa, Albano António; Inamasu, Hiroyuki (RESSLAB) *Best Paper Award in Material and Structure Response. American Society of Civil Engineers.*

Molinari, Jean-François (LSMS) *Eugenio Beltrami Senior Scientist Prize. International Research Centre M&MoCS.*

Paglialunga, Federica (LEMR) *Doctoral Program Thesis Distinction. Doctoral Program in Mechanics (EDME), EPFL.*

Environmental Engineering Institute (IIE)

Pougala, Janody (TRANSP-OR) *Best Paper Award. 11th Symposium of the European Association for Research in Transportation (hEART).*

Schueler, Andreas (NanoSolar) *Polysphère d'OR and Polysphère de la Faculté de l'environnement naturel, architectural et construit (ENAC). EPFL.*

Sonta, Andrew (ETHOS) *Best Paper Award. 10th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (BuildSys 2023).*

Wang Qianqing (EESD) *Poster Award. ENAC Research Day, EPFL.*

Battin, Tom Ian (RIVER) *Vladimir Ivanovich Vernadsky Medal. Biosciences Division. European Geosciences Union (EGU), Vienna.*

Billault-Roux, Anne-Claire (LTE) *Doctoral Program Thesis Distinction. Doctoral Program in Civil and Environmental Engineering (EDCE), EPFL.*

Carratala Ripolles, Anna (LEV) *Source d'Innovation 2023. Alliance Association.*

Chappellaz, Jérôme (SENSE) *Belgica Medal. Royal Academy of Sciences in Belgium.*

Cresspio, Omar-Garcia (CRYOS) *SEAR Young Scientist Award. Europe Air Traffic Management (ATM).*

Gugerli Rebecca (LTE) *Poster Award. ENAC Research Day, EPFL.*

Hamze Ziabari, Mahmood (ECOL) *Doctoral Program Thesis Distinction. Doctoral Program in Civil and Environmental Engineering (EDCE), EPFL.*

Lu, Xiaolong (ECEO) *SwisstopoEDU Award. Swisstopo.*

Rinaldo, Andrea (ECHO) *2023 Stockholm Water Prize. SIWI & Royal Swedish Academy of Sciences.*

Rinaldo, Andrea (ECHO) *Horton Medal. American Geophysical Union.*

Schaub, Aline Laetitia (LEV) *Poster Award. ENAC Research Day, EPFL.*

Schmale, Julia (EERL) *Best Teacher Award for Environmental Science and Engineering Section (SSIE). EPFL.*

von Gunten, Urs (LTQE) *Outstanding Achievements in Environmental Science and Technology Award, Europe, Middle East and Africa Region. American Chemical Society.*

von Gunten, Urs (LTQE) *Special Issue of Environmental Science and Technology "Oxidative Water Treatment: The Track Ahead" in Honor of Urs von Gunten. American Chemical Society.*

Architecture Section (SAR)

Reda Berrada
Nomination meilleurs énoncés théoriques

Carlotta Boxbeld et Lisa Carminati
Nomination meilleurs énoncés théoriques

Duncan Fouchet
PRI WSP - Construction et développement durable

Amélie Gaillet
Nomination meilleurs énoncés théoriques

Selen Karakoc et Flavio Gorgone
Prix de la Fédération Suisse des Architectes (FAS) Romandie

Chiara Kempter
Prix Mita Krafft Gloria

Loan Laurent
Nomination meilleurs énoncés théoriques

Alex Burri et Antonio Pagano
Nomination meilleurs énoncés théoriques

Sarah Planchamp
Prix Mita Krafft Gloria
Nomination meilleurs énoncés théoriques

Benjamin Porcher
Prix SIA Vaud

Laura Primiceri
Nomination meilleurs énoncés théoriques

Julie Riondel
Prix Mita Krafft Gloria

Justine Rochon
Diplôme «Finaliste du Prix Arditi»

Marta Brovelli et Luca Rodella
Prix de la Ville D'Ecublens

Civil Engineering Section (SGC)

Saad Abdel Jalil
Prix SGEB

Gaëlle Abi YOUNES
Prix CITEC
Prix SIA Vaud

Joëlle Luu
Prix SGEB
Prix UPIAV

Ludivine Menoud
Prix Sarada M et Rajua Vinnakota

Jean Naftalski
Prix Stucky-Gruner

Roberto Proenca-Seixas
Prix Im Maggia Engineering SA

Environmental Science and Engineering Section (SSIE)

Crosnier Agathe
Prix Durabilis

Perriard Arnaud
Prix CSD Ingénieurs

Pierre Creusot
SwisstopoEDU award.

Corinna Frank
Prix de la Société Académique du Valais

Rykner Matthieu
Prix SIA
Prix Geosuisse

Santacroce Nicola
Prix IGSO

Ledain Sélène
Prix CSD Ingénieurs

Appointments



Sophie Delhay, architect and head of the architectural firm Sophie Delhay Architecte in Paris, was appointed associate professor of architecture at ENAC.

Sophie Delhay's work interrogates the design and construction of social housing. Her practice places particular emphasis on the perspective of the residents, which she aligns with ecological dimensions. A winner of numerous prestigious awards, she will in the future explore broader sustainability issues in connection with adaptive re-use, new relationships between urban and rural areas, and the critical revision of the concept of living as a result of changing lifestyles. Sophie Delhay has just been nominated «Chevalière de l'ordre des Arts et des Lettres» by the French Ministry of Culture. She was also rewarded with the Schelling Prize 2022 (DE), nominated at the Mies Van Der Rohe 2022 Award (SP) and was awarded with the Equerre d'argent 2019 - Habitat Category (FR).

Took office on:
1 September 2023, in Lausanne



Prof. Mirko Kovac, previously full professor at Imperial College London (UK), and head of the Materials and Technology Center of Robotics at Empa, in Dübendorf (ZH), was appointed adjunct professor at ENAC.

Mirko Kovac's main research interest lies in developing flying and biohybrid soft robotic solutions for digital infrastructure systems. He specializes in robot design, hardware development and multimodal robot mobility. Mirko Kovac's achievements include receiving an ERC Consolidator Grant in 2022 (ProteusDrone: A shape-shifting soft drone).

Entry into office:
September 2024, in Lausanne.

Promotions



Professor Corentin Fivet promoted to associate professor of Architecture and Structural Design

Corentin Fivet develops computational methods and design processes for increasing the circularity of building structures.

He heads the Structural Xploration Lab (SXL), which is part of the Smart Living Lab, located in Fribourg. The SXL, which excels in the fields of structural optimization and the realization of innovative large-scale demonstrators, has forged a solid international reputation under his leadership. Corentin Fivet has won numerous awards and is considered a pioneer in circular construction research.



Professor Dimitrios Lignos promoted to full professor of civil engineering

Dimitrios Lignos conducts research with emphasis on the performance-based design of earthquake-resistant steel and composite structures. His work on

integrated computational modelling and multi-scale experimentation for the fundamental understanding and simulating structural collapse has influenced international codes and standards with regards to seismic safety of building infrastructure. This internationally acclaimed researcher has received numerous awards including the prestigious Walter L. Huber Civil Engineering Research Prize (2019). Since September 2021 he has been the director of the Civil Engineering Institute at EPFL.



Paolo Perona promoted to adjunct professor of water and hydraulic engineering

Paolo Perona works in the areas of fluvial hydraulics, ecomorphodynamics and applied hydrodynamics, with focus to sustainable management concepts.

His international reputation in these highly topical research areas is also demonstrated by numerous partnerships in the public and private sectors, as well as with universities and research centers throughout the world.



Professor Tamar Kohn promoted to full professor of environmental engineering

Tamar Kohn works in the field of environmental chemistry and environmental virology, in which she has established herself as

one of the world's leading researchers. Her current focus is on the fate of human viruses in the natural and built environment, such as in sewage treatment plants or in aerosol particles. During the COVID-19 pandemic, her research results enabled SARS-CoV-2 viruses to be identified and tracked in wastewater. She serves on a number of expert bodies, has been appointed to advisory committees of the World Health Organisation (WHO) and is an Adjunct Researcher at Eawag.



Professor Bertrand Merminod retired on 31 January 2023

Professor Bertrand Merminod, full professor of topometry in the School of Architecture, Civil and Environmental Engineering, retired at the end of January 2023. Bertrand Merminod

studied at EPFL before returning as an associate professor in 1995. Geomatics engineering is his main focus; his research areas include satellite positioning, geodetic networks, structural deformation and navigation instruments. His findings have resulted in one patent, and he also assisted colleagues with the creation of a start-up. Bertrand Merminod is a member of numerous international committees and has also served on various bodies at EPFL. He is a dedicated lecturer with an impressive list of publications to his name. We warmly thank Professor Merminod for his commitment to our School.



Professor François Golay retired on 31 January 2023

Professor François Golay, full professor of spatial information systems in the School of Architecture, Civil and Environmental Engineering, retired at the end of January

2023. François Golay studied at EPFL before returning in 1994 as an associate professor and head of the Laboratory of Geographic Information Systems (LASIG). His research focuses on spatial decision support systems, data infrastructures and information exchange, as well as exploratory spatial data analysis and visualisation. The great commitment he has shown to LASIG has enabled it to grow strongly. François Golay was also head of the Environmental Science and Engineering Section (SSIE) from 2013 to 2021. We warmly thank Professor François Golay for his commitment to our School.



Professor David Andrew Barry retired on 31 August 2023.

David Andrew Barry joined EPFL as a full professor in 2005. He is a leading expert in water quality, hydrodynamics, groundwater analysis and soil erosion. His research has a particular

focus on contaminant transport, the remediation of soil and groundwater, and the impact of climate change on large lakes. This acclaimed researcher has an impressive list of publications and is a highly esteemed lecturer and colleague. He was also a very committed member of the School who serves on key committees and has made a significant contribution to EPFL. David Andrew Barry was Dean a.i. from mid-2018 to end of 2019. He was also head of the Environmental Engineering Institute (IIE) from 2008 to 2012 and from 2017 to 2023. We warmly thank Professor David Andrew Barry for his commitment to our School.



Professor Eugen Brühwiler retired on 30 November 2023.

Professor Eugen Brühwiler joined EPFL as an associate professor in 1994. His research focuses mainly on structural and material engineering, existing civil structures (especially

bridges of high cultural value) and ultra-high performance fibre concrete. He has filled several important roles within the School and EPFL and has also served on numerous international scientific committees and on the editorial boards of a number of scientific journals. In addition he is a highly valued lecturer, supervisor and mentor. We warmly thank Professor Eugen Brühwiler for his commitment to our School.



Professor Bernard Cache retired on 31 July 2023

Bernard Cache joined EPFL as an associate professor in 2013. His scientific focus is on the study, processing and application of materials. He has also devoted particular attention

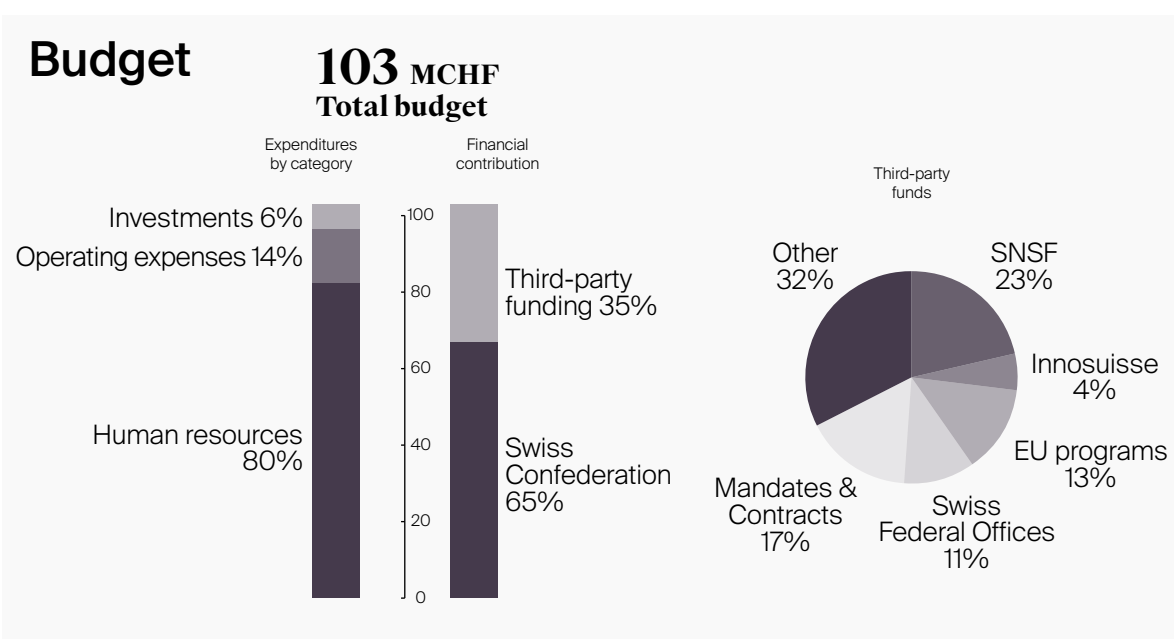
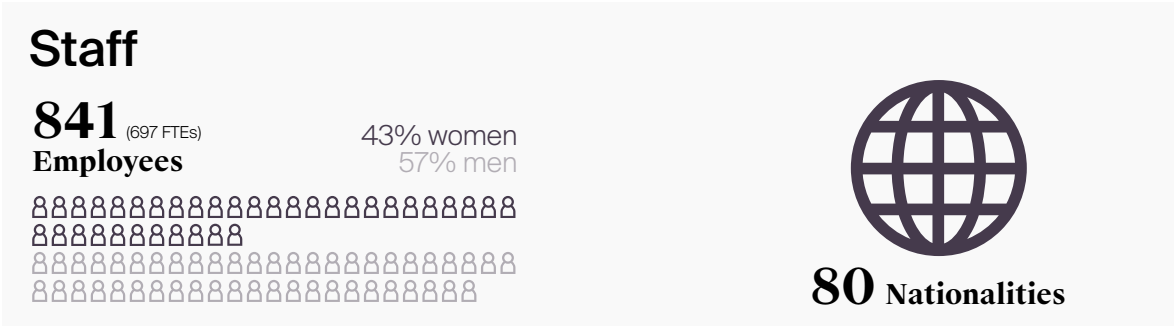
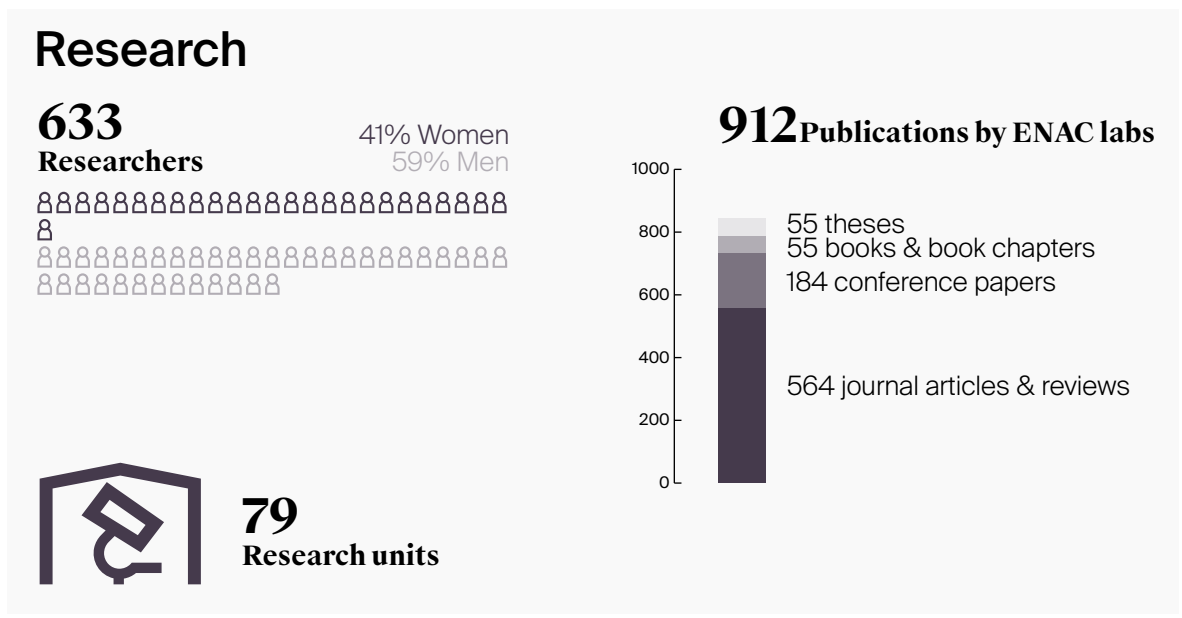
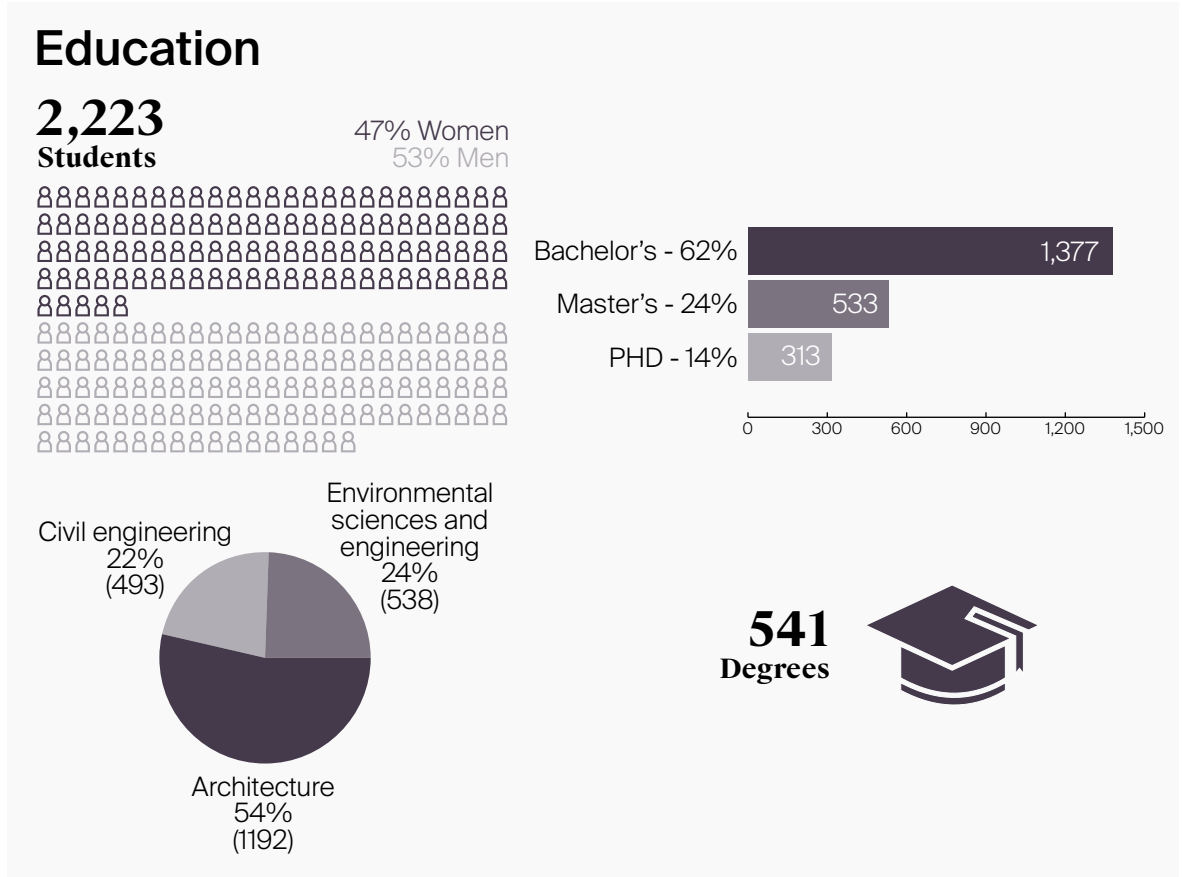
to the creative use of new technologies and innovative digital tools. This internationally acclaimed researcher is the author of several important publications and regularly participates in conferences, exhibitions and as a juror for international architecture competitions. He has had a major impact on the School through his commitment to teaching and supervising. We warmly thank Professor Bernard Cache for his commitment to our School.



Professor Franz Graf retired on 31 July 2023

Franz Graf joined EPFL as a visiting professor in 2005 and was appointed to an associate professorship in 2007. His research covers modern and contemporary construction systems

and their preservation. He places particular emphasis on the use of materials and resources for the reutilisation of historic buildings, with due regard to environmental requirements. Franz Graf has written numerous books and articles and has also contributed to several standard works. In 2013 he won the research category of the prestigious European Union prize for cultural heritage, the Europa Nostra Award, for his work on the refurbishment of the Cité du Lignon housing project near Geneva. We warmly thank Professor Franz Graf for his commitment to our School.



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