

Climate Magazine No. 6



Adapting to climate change



The COP23 Climate Change Conference in Bonn made small steps towards implementing the conditions of the Paris Climate Agreement. As the current climate objectives of the Paris Agreement are not sufficient for limiting global warming to well below two degrees Celsius, it was decided already in Paris that over time, the individual nations would have to step up their efforts. This also holds true for Switzerland. If we assume that global warming will continue, then climate change adaptation takes on an increasingly important role. We can drive adaptation more directly by reacting to the challenges that the effects of climate change pose. We can thereby limit the risks and seize the opportunities.

The Zurich Climate Prize has honoured pioneering projects and implementations which contribute to protecting our climate. It helped provide an incentive for companies, institutions and start-ups to come up with new ideas to reduce CO₂ emissions. The prize money helped the winners to pursue, test and implement innovations. Today, Switzerland has a sound awareness for climate protection and is well set up to face the challenges.

As the saying goes, it's best to quit while you're ahead. In this spirit, we have reached a crossroads: Zurich Switzerland will not call for climate projects in 2018 and will enhance its focus on the unique Zurich Natural Hazard Radar which promotes public awareness on climate-induced risks and how best to deal with them. We will invest in an expansion of the tool with additional perils such as storm, hail and earthquake, as well as the risk posed by radon.

Why is this important? New research shows that the average temperature on earth will increase more quickly and intensely than previously anticipated. What will be the repercussions? More storms, floods and mudslides – in other words, more extreme weather. The buzzword on everyone's lips these days is «smart protection». The better prepared we are, the less damage we will sustain. By investing in the Natural Hazard Radar, Zurich helps Swiss citizens adapt to the changing climate.

With a few clicks, the free online tool allows you to understand which natural hazards threaten your home or your company and what protective measures you can take to protect it. Most of the time, simple constructions will suffice to avoid a lot of damage.

You will find more information about our plans in this magazine. And we also bring you portraits of a few climate prize winners - see for yourself how they got on and where they stand today. And of course, find out about recent developments in climate protection.

I wish you an interesting read.

A handwritten signature in blue ink, appearing to read 'J. Masur'.

Joachim Masur

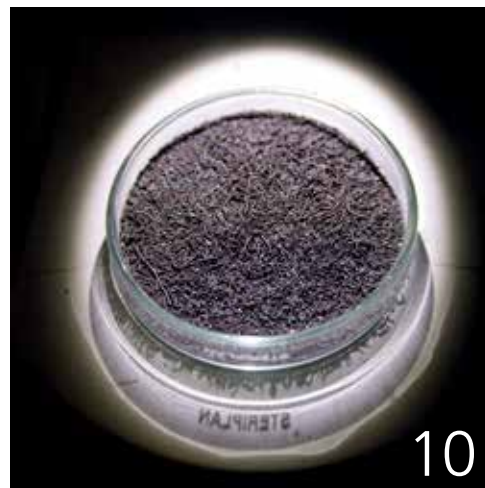
Chief Executive Officer Zurich Switzerland

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W.I.R.E. explores life and work in the world of tomorrow

The everyday actions of tomorrow will have a significant impact on climate change and energy consumption. According to futurologist Stefan Pabst of think tank W.I.R.E., it's up to everyone – not just corporations and political organisations – to play their part and learn to live in a more mindful manner.

Stefan Pabst, what will be the biggest challenges for future generations?

One major challenge involves the shift in demographics: we are living longer and longer. This phenomenon is also referred to as the «silent social revolution», as it is sure to play a fundamental role in the way we live our lives. Not only will work and the healthcare system be affected, but also social cohesion. Without solidarity, it will be impossible to maintain social security for a population that keeps getting older. Another key challenge involves the availability of energy and climate change.

Moving forward, our society will be forced to find solutions to more than just the shift in demographics. In your opinion, which issues are the most urgent?

The widespread use of technology leads to increasing levels of energy consumption. Fossil fuels are used to fill the gap, but are known to contribute to global warming. The third big challenge relates to digitisation and its effect on our lives. Overwhelmed by information and a world that shows no signs of slowing down, it is getting more and more difficult to meet new demands at work and find time for friends and loved ones.

Who will be called upon to provide the necessary motivation to allow us to overcome these challenges successfully?

This is a job for everyone. Usually it is the big companies and the state who are expected to do the most. But these challenges crop up in everyday life, and that is precisely where they must be tackled. At the end of the day, any progress we make will be a result of cooperation by everyone. First of all, we must set mandatory targets with regard to the climate and to acceptable automo-

bile emission rates. To reach these goals, we must turn to solutions and innovations that are currently in the planning stage. Corporations and scientists must be given the freedom to develop their ideas so their projects can be brought to life. Second, this motivation must also come from common citizens. The world is in need of social and cultural change. People must take responsibility for their actions and become aware of their surroundings. It is important that people realise that their own decisions – even the smallest ones – can have a huge impact on global change. I am convinced that we cannot solve the energy problem without changing the way we see ourselves.

This is a topic that is explored in detail in your book «How We Will Live Tomorrow» (see box on page 6). How will the balance of energy affect the way we live in the future?

Energy consumption is on the rise because of our lifestyles, the widespread use of digital applications and the sheer number of people living on the planet. We travel more, and we wire our homes and offices with the latest technology. But at the same time,

there is increasing awareness around the benefits of a sustainable lifestyle. People are becoming environmentally-conscious, paying attention to their energy consumption or the origins of the food they eat, and foregoing ownership of their own cars. In this respect, one can be both optimistic and pessimistic about the future. It should be noted, however, that the improved efficiency of technical devices will more than likely not be sufficient to offset the growing demand for energy.

As the saying goes, we can never know what the future actually holds. We can, however, play an active part in creating it. In our book, we have developed several scenarios that can be used today to determine the best courses of action for tomorrow. It is our hope that these scenarios will spark a social debate which will enable us to come up with key action plans, and to work together to implement them.

Which solutions can help us get a grip on the energy problem?


There are several possibilities, but we don't really know which ones will catch on. One

Not with fear, but with courage and confidence

Philosopher and physicist Stefan Pabst of W.I.R.E. looks at how technological progress and the development of new value systems can bring about social and cultural change. It is his hope that people will meet tomorrow's challenges not with fear, but with courage and confidence. W.I.R.E. is a leading interdisciplinary think tank. For nearly ten years, it has been examining global developments in

the fields of business, science and society. The goal of the Zurich-based think tank is to identify new trends early, and then translate them into strategies and action plans for corporations and public institutions.

Further Information:
www.thewire.ch

A full-page photograph of a man with short blonde hair and glasses, wearing a light blue button-down shirt, dark blue trousers, a brown belt, and black shoes. He is leaning against a white-barked tree trunk with his hands in his pockets. The ground is covered with fallen yellow and orange leaves. The background is a blurred garden with more trees and foliage in autumn colors.

**«We can never
know what the
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Stefan Pabst, philosopher, physicist
and trend forecaster

of the biggest challenges lies in the storage of renewable and decentralised energies. We can't control the weather. There are always going to be gaps between the supply and demand of electric power. One of the ideas being tested today is an



electric car that operates in a smart power supply system as a decentralised storage device. This is how it works: a home owner has a PV system on his roof and produces more electricity than he consumes. He uses the extra power to charge his car that is sitting outside in his driveway. In the afternoon, he consumes more electricity in his house than he produces. He can now have the power in his car stream back into his home's power supply.

Where is there untapped potential?

Along with the consistent creation of renewable energy, we should also be focusing our efforts on nuclear fusion. Current nuclear fission processes in nuclear power plants are extremely risky, and we continue to pay the price for using them. Nuclear fusion, on the other hand, is practically harmless. The system works in much the same way as the harnessing of energy from the sun: at high pressure, hydrogen nuclei fuse to form a helium nucleus. During this process, chain reactions are physically impossible, and the resulting radioactive material has a relatively short half-life. Furthermore, vast amounts of energy are

released as a result of the fusion, energy which can later be used as heat to produce power. Nuclear fusion is likely to be one of the most important areas of research over the next 50 years. Energy security will only be attained by developing a variety of solutions which can be customised to meet the individual needs of everyone.

What is the best way forward?

We need to both explore new ideas and develop methods to implement them. It will be vitally important, for example, to invest in basic research so innovative solutions can emerge in the first place. We must also create platforms which will allow us to test the results of our research in everyday situations. Today's energy issues are becoming a matter of urgency, which means we will have to speed up our decision-making processes. Prototypes should not only be developed for machines, but also to bring about social change. This will require the establishment of new ecosystems, with representatives from politics, business and science working together in both a theoretical and practical manner to tackle complex issues such as the future of energy supply.

HOW WE WILL LIVE TOMORROW

Food for thought for the era of longevity

During the course of a two-year research project, the think tank W.I.R.E. studied the effects of increasing life expectancy and the resulting possibilities for a new way of life. One of the fruits of this project is the newly released book «How We Will Live Tomorrow», which presents 44 possible scenarios for planning our lives in the future. The book can be used as a decision-making tool or as inspiration for shaping the world of tomorrow. The scenarios serve as a reality check for the Swiss population, and offer future-focussed action plans for the fields of society, business and politics.





Working in the world of tomorrow

Increasing life expectancies will have a significant impact on professional life.

We are living longer and longer. Consequently, retirement costs are increasing, economic productivity is decreasing and, perhaps most importantly, we have more time on our hands. We currently live in an age of medical breakthroughs, automation and the relaxing of traditional values. But the predominant way of life today is basically the same as it was two generations ago. Shifts in roles, the merging of work and private lives and the search for personal fulfilment, however, mean that in today's world, multitasking is the norm rather than the exception. And as a result, we are becoming overstrained, depressed and burned out. The think tank W.I.R.E. teamed up with

Swiss Life to search for alternative ways of life – using scenarios that ranged from the realistic to the extreme. Swiss residents of all backgrounds were invited to take part in a survey to evaluate the feasibility and desirability of these scenarios. The study concluded that there is a great discrepancy between feasibility and desirability. Scenarios with flexible working arrangements were especially desirable, while participants strongly rejected those scenarios which were heavily shaped by technology. The study also found that when it comes to interpersonal relationships, participants long for the customs of the past.

Work

An increase in life expectancies means, first and foremost, that we will have more time. In the working world of tomorrow, we will take more and longer breaks, but also work longer hours. Professional life will not just begin after school and end with retirement, but continue well into old age and take place in several stages, with a number of breaks in between. As with education, many work sectors in the digitisation age will no longer be dependent on any one location. People will work everywhere: in offices, at home and while travelling. One of the consequences of these new possibilities, and of the increasing need for independence, is that the number of self-employed and self-sufficient people is on the rise.

Leisure time

In the future, we will work more but also take more and longer breaks. If we remain prosperous, soon we will be faced with more work-free time than ever before in the history of mankind. This freed-up time, coupled with the search for personal fulfilment and the lack of identification with standard work situations, will contribute to leisure time playing a much bigger role in the future than it does today. It is also possible, however, that we will have less leisure time. This could be the case if our OASI and pension funds are no longer sufficient and we are forced to work longer.

Living

The ability to work at all times and from anywhere will lead to a move from stationary to mobile living. More and more people will wish to have the choice to move as they please, and thus maintain a certain level of independence. As a result, motor homes and furnished apartments will grow in popularity, especially amongst the older generation. Moreover, due to increased social fragmentation, the relaxation of traditional values and ever scarcer amounts of space, we can surely expect to see a variety of new living arrangements. These will include everything from multi-generational households to apartments designed for specific age groups and high-tech single-occupancy flats.

Digitization provides opportunities for climate protection

Information and communications technology (ICT) can play an important role in the development of a low-carbon economy in Switzerland. By the year 2025, ICT has the potential to prevent up to 3-4 times more greenhouse gas (GHG) emissions in Switzerland than that which is caused by the overall production, operation and disposal of ICT devices and infrastructures.

This is the conclusion that was reached by «Opportunities and Risks of Digitalization for Climate Protection in Switzerland», a study conducted in July 2017 by Lorenz M. Hilty and Jan C.T. Bieser of the Department of Informatics at the University of Zurich in conjunction with Swisscom and WWF Switzerland. In precise terms, by the year 2025, ICT can help save up to 6.99 metric tonnes (Mt) of carbon dioxide equivalent (CO₂e) per year in Switzerland, while its own GHG footprint will only equal 2.08 Mt CO₂e. However, in order for the ICT sector to take advantage of this excellent opportunity to contribute to climate protection, certain assumptions must hold true. In particular, the authors of the study cite the importance of regularly tapping existing technical and economic potential by way of ambitious and goal-oriented measures. They also see great potential for reducing GHG emissions via ICT-based («smart») solutions in the transport, building and energy sectors. At the same time, greenhouse gases emitted by the ICT sector itself must drop by 17%, which is both technically and economically feasible as long as gains in efficiency are made.

The study found that the majority of GHG emissions from the ICT sector are caused by end-user devices. Currently, around 2/3 of consumption-related GHG emissions from the ICT sector in Switzerland are caused by desktops, laptops, tablets, smartphones and printers, while 1/3 of these emissions are generated by the operators of telecommunication networks and data centres. By replacing stationary

desktop computers («traditional PCs») with mobile devices (laptops, tablets, smartphones), whose weight and electrical power consumption are restricted to provide for greater comfort, we can cut down on emissions that are normally associated with their use and construction.

The shift to energy-sufficient devices

Another advantage of mobile devices is that they are «energy-sufficient», as they are required to consume only minimal amounts of power so they can be used for long periods of times with small and lightweight batteries. With these devices, it is possible to reduce per capita emissions caused by the use of ICT, all the while improving user-friendliness. By shifting to lightweight and energy-sufficient mobile devices, however, the amount of emissions generated during production will rise. It will therefore be all the more vital that the ICT sector make the supply chain «greener» and lower «embedded emissions» (emissions arising in countries

tiko

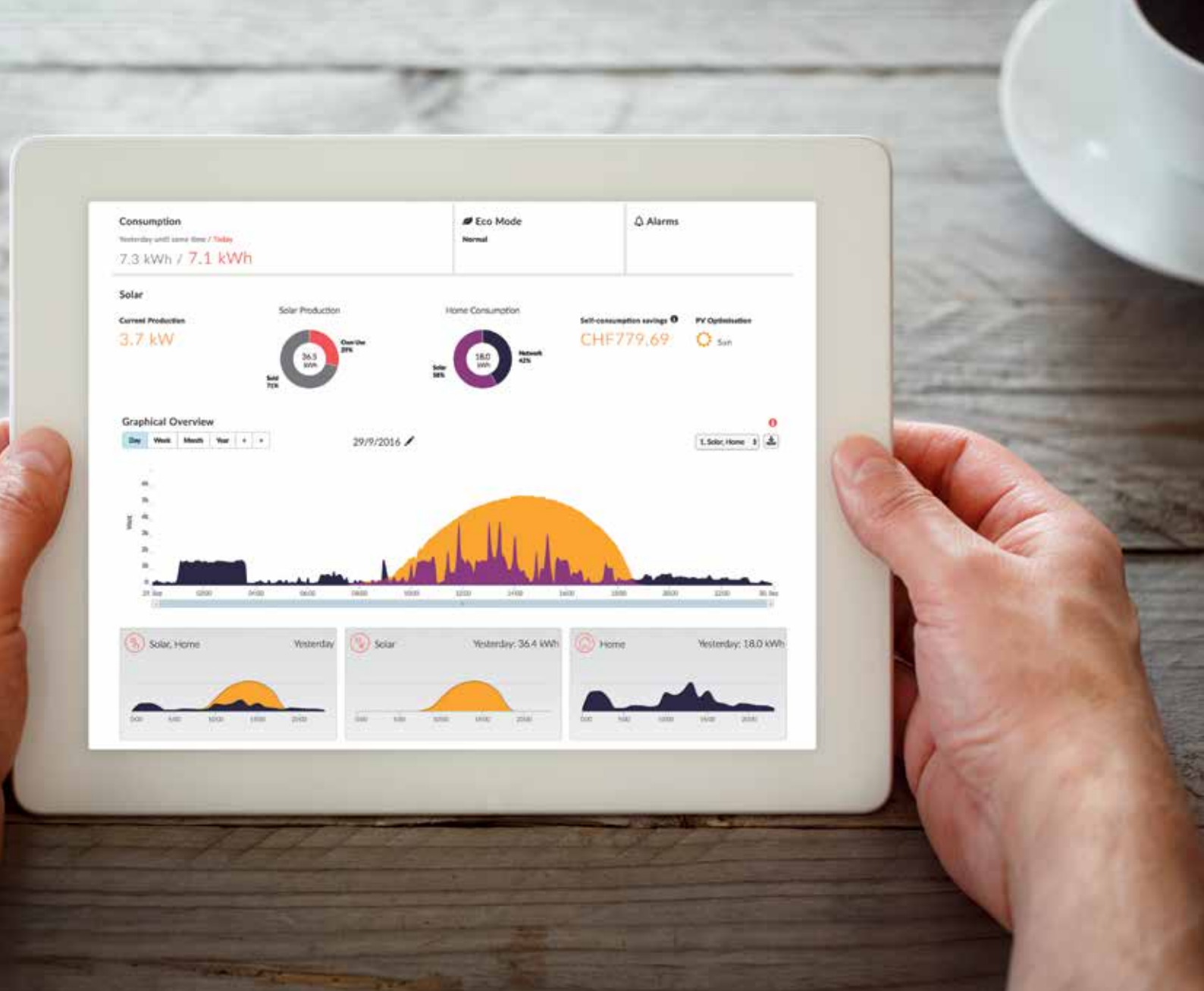
Swisscom has incorporated its energy-saving solutions and the tiko offer into a platform that consolidates electrical devices of thousands of households into one network, where they can be switched on or off as needed. Energy production is dependent on the weather and therefore in a constant state of flux. This, in turn, affects the energy

supply and the stability of the grid. If Swissgrid calls for a restriction in the amount of energy that is being consumed, tiko automatically delays the heating cycles of its subscribers, allowing for consumption levels to drop before another wave of energy consumption begins. As a result, consumers can save up to 60% on their heating bills. tiko is currently the largest energy storage network in Europe.



An informative overview of all the devices connected to the tiko

where raw materials are extracted for the production of devices). A key factor therefore is the reduction of the use of fossil fuels across the entire product life cycle. According to the authors of the study, nothing would so endanger the future GHG footprint of the ICT sector



platform is neatly displayed on the iPad.

than if this positive trend were to become compensated (or overcompensated) by an increase in the number of mobile devices per person and a decrease in the length of such devices' operating lives. In the worst case scenario, society would adopt a «throwaway mentality» with regard to digital electronics.

Such a mentality would cause the GHG footprint of the ICT sector to rise considerably, even if most consumers continue to respect the provisions of the Swiss Recycling System for Electrical and Electronic Waste. If steady (or increasing) amounts of already scarce resources are allocated to larger numbers of ever smaller devices, then the dispersion (and thus irreversible use) of rare metals will rise. Similarly, resource shortages and the expense (including energy expenditure and result-

ing emissions) required for the extraction and recycling of scarce raw materials will also increase. A second risk lies in the possibility that data traffic, especially data exchanged between machines, will grow at a quicker rate than the energy efficiency of the infrastructure. This would lead to an increase in emissions from the predominant part of the global Internet, which is still driven by non-renewable energy sources.

Consumers will not feel the difference

While carrying out the study, the authors put ten specific applications to the test. One of these applications involved the use of smart load management during the consumption of electricity. Such management can – as demonstrated by Swisscom's «tiko» – significantly reduce household energy consumption without

compromising the comfort of consumers. Another example is co-working, as ICT is now making it possible for more and more jobs to be done remotely. Co-working spaces can optimize or reduce required office space and shorten commute times. Further examples include car sharing and inter-company logistics solutions.

The University of Zurich study (PDF)

The long form of the study can be downloaded as a PDF, or simply by scanning its QR code:

goo.gl/17k4HA

In Hinwil, KEZO's «alchemists» turn waste into gold

For thousands of years, human beings have been searching for the fountain of youth and a secret recipe for turning iron into gold. And while alchemists and mystics continue their quest, the folks at the KEZO waste incineration plant in Hinwil have already – at least in part – found their holy grail.



KEZO CEO Daniel Böni: he and his team have developed thermo-recycling.

At the KEZO waste incineration plant in Hinwil, miracles are everyday occurrences. Thanks to its thermo-recycling plant, the company is able to separate 99% of valuable materials such as gold, copper and aluminium from waste and reintroduce them into the material cycle. This so-called «urban mining» makes good sense, both ecologically and economically. The process begins with an octopus-like grabber, whose six arms plunge into the mountain of waste found on the other side of the plant's shatter-proof panes of glass. Once it is full, the grabber then disappears to drop the waste into a funnel leading to the incinerator. It does this over and over again, without end: at the KEZO in Hinwil, waste is processed 24 hours a day, 365 years per year. Those

who simply think of waste as stinky, slimy, mouldy remains can learn a thing or two at the KEZO, where CEO Daniel Böni and his team are in the business of making one of mankind's most primitive dreams a reality – they turn the old into new. «It's almost like a fountain of youth,» jokes Böni. «Old people climb in, and fresh, young people climb out.»

60 kilograms of gold per year

KEZO in concrete terms: every year, from 100,000 tonnes of slag, the company generates 60 kilograms of gold, 1,500 kilograms of silver and 800,000 kilograms of copper and copper alloys. The lion's share of non-ferrous metals is made up of aluminium (70%) and iron (approx. 10,000



Separating tables are used to separate non-ferrous metals from

tonnes). Böni is thrilled with the results: «the copper content of our refined slag is equal to or higher than that found in the ore of a copper mine. We can extract just as much gold from one tonne of refined slag as from one tonne of ore from a good gold-mine in South Africa.» Except it is much better for the environment to recycle metal than to extract new copper or dig for gold.

And that is not all: separating and recycling the valuable materials also makes sense from an economic point of view. With the current price of copper at over 5 francs per kilogram, this amounts to more than 4 million francs obtained from the waste-extracted copper. And with gold now at 40,857 francs per kilogramme, KEZO's gold



precious metals on the basis of their density.

production brings in around 2.5 million francs per year, which is nothing to scoff at. Thanks to so-called «urban mining», raw materials have become an environmentally-friendly business for traditionally resource-poor Switzerland. This development is both remarkable and extremely satisfying, considering KEZO gold comes from electronic waste that is thrown away in the rubbish. The recycled metals are sold to smelting and production plants in both Switzerland and abroad.

The magic word is thermo-recycling. Contrary to conventional wet discharge systems, in which the slag is cooled down in water, the system developed by Daniel Böni and his team in Hinwil allows the slag to

stay dry. The major advantage of this system is that the precious metals clump together less with the minerals in the slag, «making it that much easier to extract them,» notes Böni. Furthermore, dry slag purified by heavy metals is much less harmful to landfill bottom liners than crudely-prepared wet slag. Until recently, iron was separated by magnets and the rest of the waste was dumped into a landfill. But that is now a thing of the past.

What was behind the gold rush fever in Hinwil? One catalyst was the Zurich Climate Prize, which was awarded to KEZO in 2010. KEZO also won the 2010 Special Prize for its refined slag sorting pilot plant, which has been in operation since 2008. This

«Yes» to metal recycling

Residents of the city of Zurich are already convinced by the idea of thermo-recycling. In 2015, 91.6% of the city's voters said «yes» to metal recycling, making a powerful case for the process. In addition, the Canton of Zurich has invested 38.9 million francs in Zurich's Hagenholz waste incineration plant to convert from wet to dry slag discharge. In doing so, it has taken on a pioneering role in Switzerland. Of the 30 waste incineration plants in Switzerland, 4 have already made the switch to thermo-recycling.



From the control room, plant staff manage and monitor all sieving, separating, breaking and transport operations – larger pieces such as bocce balls are removed by hand.

accolade would prove to be the beginning of a success story that has attracted widespread attention both at home and abroad. «Waste incineration produces energy and slag that contains several recyclable materials. Our goal was to extract these materials. Dry removal allowed us to loosen even the smallest bits of metal from the slag and reintroduce them into the material cycle,» explains Böni. He continues: «waste is no longer just waste – it has become an important resource.»

The special prize from Zurich was the impetus for engineer Böni and his team to continue with the development of their system and promote their vision of thermo-recycling. The team is supported by the Centre for Sustainable Management of Recyclable Waste and Resources (ZAR), an organisation funded by various different donors. The special award has also brought about increased acceptance of the project throughout the entire KEZO and ZAR networks, as well as an extraordinary amount of goodwill. ZAR considers itself a thinktank whose role is to both develop and advise.

Little by little, KEZO/ZAR have fine-tuned their sorting plants and procedures. A process control system with 22,000 specifications oversees all processes. Illustrated process data help the shift manager to make the right decisions. From inside the plant, you won't see or smell any waste whatsoever. In fact, you might just think you've ventured into the clinic-like cleanliness of Peter Sauber's high-tech Formula 1 race car construction site on the other side of Wildbachstrasse.

Up to 850°C

But unlike in the cool setting of a Formula 1 shop, the temperature at KEZO can really heat up. Waste has an extremely high heat value and burns with ease – the combustion chamber can get as hot as 850°C. Inside the chamber, the organic part of the waste is transformed into heat while the metals and minerals are exposed. A second treatment process separates the recyclable materials in the slag and electrofilter ash and reintroduces them into the material cycle. According to Böni, «this process is an important part of thermo-recycling.»

During the first step of the treatment process, magnets are used to remove the iron from the slag. The slag is then split into five different groups depending on its size.

«Waste is no longer just waste – it has become an important resource.»

Non-incinerated items such as rootstalks, telephone books and pieces which cannot be broken (such as chrome-plated steel pans) are manually removed from the slag pieces that are larger than 80 millimetres in size. Special breaking devices are also used to reduce slag pieces to the desired size. The next workstation: fully clad pipes, fans, sieving machines. Information panels explain that fine and broken waste incineration slag must be moved back and forth quickly and sieved. Super-sensitive sensors recognize a variety of different materials from their magnetic states. A high-performance computer immediately interprets



In the waste bunker: the crane operator, working behind shatter-proof glass, ensures that the incinerators are filled properly.

the signals and determines which stainless steel parts are to be separated from the slag. Those who can still remember the good old Ochsner dustbin and its knack for stinking up the kitchen are bound to think they are in some kind of science-fiction film.

The stainless steel pieces are blown out of the slag by compressed air released by jets controlled by the computer. Non-ferrous metals such as aluminium, copper, tin and precious metals are separated from the slag by an «eddy current separator». This is how it works: a rotating magnetic field in the pulley creates an eddy current in every electrically conductive metal particle, and the current in turn produces a magnetic field. As a result, the magnetic pieces are ejected from the drum and can be separated as non-ferrous metal.

Separating tables at the heart of the operation

«The plant is centred around its orange separating tables,» boasts Böni. These tables are used to separate non-ferrous met-

als on the basis of their density. The metals fall onto a fine, swinging sieve, where a fan blows them with ambient air. «This process allows for the lightweight aluminium to be lifted from the metal and strained through the sieve below,» explains the CEO. The heavy metals remain on the sieve and are transported upwards by the movements of the sieve. Böni opens a cavity and shines a torch inside; it resembles some sort of strange moonscape.

For Böni, there is no doubt: «the future lies in thermo-recycling.» And he is not the only one to think so: barely a week goes by without school classes, politicians or environmental experts from both Switzerland and abroad streaming through the doors of the KEZO in Hinwil. «There is a massive amount of interest,» beams Böni. «Our dry slag system has proven to be much more efficient – and ultimately more profitable – than its wet slag counterpart.»

Böni laughs. Dry slag is his favourite topic of conversation. Just as others might rave over Cristiano Ronaldo or Madonna, when it

comes to waste and wet and dry slag, Böni loves to talk shop. And he hopes to revolutionise his recycling system even further: «dry slag incineration plants will change the way people think of waste. In the future, thermo-recycling will make recycling more efficient and much easier for everyone.»

Daniel Böni understands that he is unable to control the amount of waste people produce. But he is confident: «the raw materials from waste are the resources of the future.» The KEZO is ready for urban mining on a large scale: its Hinwil plant has been operational since November 2016 and is capable of processing 100,000 tonnes of dry slag per year from waste incineration plants in Horgen, Zurich, Monthey and Solothurn. Böni proudly declares: «the plant is designed such that it can be expanded to double its current load.»

Further information
www.kezo.ch

«Driving is becoming more attractive»

Self-driving cars and new professional mobility providers are about to turn the world of public transport and private automobile traffic upside down. This is a conviction held by Caspar Sträuli of the consulting firm Infrac.

Congestion, traffic jams and nowhere to park: driving is becoming more and more of a hassle.

That's what some people think. I find the opposite to be true: driving is becoming more attractive.

How so?

«Self-driving cars are safer. Today, 90% of all accidents are caused by human error. And because I no longer have to steer the car myself, I can get some work done or a enjoy a book or snack just like in the train.»

Older folks might think of David Hasselhoff aka Michael Knight getting picked up and driven around by his robotic car K.I.T.T. in the TV series «Knight Rider». When will driverless cars become a reality?

In most scenarios, 2035 is cited as the year when the first self-driving cars will be able to be safely used on motorways.

Will public transport become superfluous with the onset of self-driving cars?

No, but it is likely to come under some pressure. In the future, even buses and trains will be autonomous, which will drive down per-kilometre costs considerably. These costs will drop by nearly 50% for regional buses, and by around 15% for trains. In rural areas, where traffic is light, trains will have a hard time surviving. But in the big cities and across major urban areas, where lots of people are on the move, they will remain indispensable.

How do you picture the commuter traffic of the future?

It will be comprised of self-driving buses, in particular minibuses. These robo-taxis will seat 6 to 10 passengers and run in villages, rural areas and urban neighbourhoods.



Caspar Sträuli, Bachelor of Engineering from ETH, MBA from ETH, Partner and Division Manager at Infrac AG.





Visionary: Volkswagen introduced its first robo-taxi at the Motor Show in Geneva: «Seducer», the Self Driving Car.

Kind of like today's shared taxis.

Yes, they will be available on demand and offer a door-to-door service. Those looking for more privacy will have the option of booking their very own minibus, but they will have to pay extra for it. Robo-taxis will take guests to the nearest suburban train station, or else to a bigger train station, for example.

By doing away with the walk from your front door to the station, and the transfer from the local to the regional train, you can reduce your travel time substantially.

True. What's more, thanks to the availability of the buses and their quick travel times, demand will increase, and with it, revenue. And because the per-kilometre costs of robo-taxis are significantly lower than what it costs to take the bus or train today, tomorrow's public transport can be operated in a cost-effective manner. At Infrac, we've calculated these costs in a research project that has yet to be published. 10 robo-van trials will be conducted in Switzerland between now and the end of the year. For these trials, a conductor will still be present.

In the future, these robo-taxis will replace regional trains and underutilised regional and district buses. What will

happen to the freed-up railway lines?

Good question. Perhaps robo-vans will run along the former railway lines, or the lines will be turned into bicycle paths. But one thing is clear: soon we will no longer need two different systems with roads and tracks in order to get around.

Might the use of robo-taxis be solving one problem but creating another? Even in the future, most people will head to the office and back home again at peak times. During these times, many robo-taxis will be in use. But what will happen to them after the morning rush and before the evening commute?

Not to worry. They will never be idle for long. Robo-taxis are extremely versatile. They can be used to get kids to school or elderly people to the doctor or hospital. And they are perfect for parcel delivery services, which is also an up-and-coming sector.

Will it make sense to own a car in the future?

In terms of quality, public transport and cars will become increasingly similar. Those looking for flexibility while on the go will not need their own car in the future. Today's cars stay parked for 23 hours per day, and when they are driven, they only carry

INFRAS

INFRAS has been a researcher and consultant in the field of sustainable development since 1976. Its experts help public and private firms to construct environmental management systems and complete environmental impact assessments and environmental accounting. INFRAS consultants also work with the government to develop political processes aimed at facilitating climate change adaptation. They devise measures for reducing greenhouse gas emissions in the energy sector (electricity, buildings, transport), as well as in the areas of industrial production, agriculture and waste. INFRAS assists countries, cantons and communities with the analysis and reporting of greenhouse gas emissions, checks corporate CO₂ target agreements and advises the federal administration during the development of national systems for emissions trading and compensation projects. At INFRAS, Caspar Sträuli deals primarily with strategy and marketing concepts, pricing and profitability analyses. His work helps to advance the mobility industry. INFRAS is Zurich's knowledge partner for the Climate Dialogue.

www.infras.ch



On the go with the push of a button: robo-taxis are available on demand and ordered conveniently via an app. They arrive within minutes.

an average of 1.1 persons.

That makes little sense, neither from an economical nor an ecological point of view.

Exactly. That's why the collective use of transport will be easier and more attractive in the future. An example: in Stuttgart, there are 1.6 million cars. Estimates have shown that in the event of a total transition to autonomous vehicles, the city's entire public and private transport demands could be satisfied with the use of just 70,000 robo-taxis.

The concept of service is becoming more and more important to mobility.

Look how quickly Uber has gotten the upper hand not only over the taxi industry but also over the public transport domain. Soon there will be new professional mobility providers. Thanks to digitization, the internet, mobile devices, GPS and apps, supply and demand are brought together quickly and easily on online platforms. And we've only just gotten started.

Can you elaborate?

The Uber app lets you communicate with private drivers to request taxi rides. With «Sharoo», you can use private cars that are simply parked on the street and waiting to be picked up. «Fliinc» provides carpooling services. The platforms are linked together, convey information, advertise, promote offers, evaluate and accept payments.

Do these platform operators have their own means of transport?

Not necessarily. The transport may be offered by a service provider from another sector who owns the customer interface and who therefore becomes part of the mobility market value chain. Even companies like the SBB are keen not to miss out: they are currently working together with their University of St. Gallen lab to come up with solutions for the future with regard to service and transport management.

You speak as a doctor would to a patient. But not all patients take their doctor's advice to heart. Most people are still drawn to auto shows featuring concept cars and high-performance sports cars, while cars with

innovative drive systems remain something of a niche market.

As self-driving cars become more appealing, a greater number of consumers will be ready to make the switch. For most people, comfort and safety are the alpha and omega. The conservation of resources is another issue that will be determined by how many cars are privately owned in the future, and how these cars are used. As the number of cars per inhabitant drops, so will the number of vehicles that must be produced. Garages and public parking spaces could then be used for other purposes.

True car lovers are not always so reasonable.

You may be right. But the fact that there are fewer and fewer streets for conventional cars could make owning a car less of a joy and lead individuals to make increased use of mobility as a service. The number of cars per inhabitant is already dropping steadily in big cities, while in rural areas it continues to rise. This is hardly surprising considering the wide selection of alternatives available in cities, such as public transport, bicycle paths and pedestrian zones.

Using online technology for greener returns

Transparency in the investment arena: at yourSRI.com, investors can, at the touch of a button, see which of their funds are responsible for the most CO₂ emissions. The FinTech portal can now also examine funds according to Environmental, Social and Governance (ESG) criteria and carbon footprints.

yourSRI.com has its finger on the pulse: even before Dieselgate, investors were increasingly interested in more than just the highest possible returns. They want to know how firms they invest in make their money. Animal lovers, for example, are careful to choose companies that do not perform tests on animals. Others have an aversion to nuclear power or genetic engineering, or firmly oppose child labour or the production of weapons. Nonetheless, today it is much easier for individuals to see, at a glance, all the various ingredients in a frozen pizza, than it is to obtain more information on investment products than the usual financial figures associated with them.

yourSRI.com fills this gap. Their project Investment Carbon Screener won an award at the 2014 edition of the Zurich

Oliver Oehri provides for transparency

At CSSP, things are just getting started. In 2018, the company hopes to double the number of funds evaluated by yourSRI.com on a daily basis to around 8,000. Another objective is digital training – their video-based academy «myImpact-Academy.org», already boasts 1,700 educational videos. The man behind it all is Oliver Oehri, Executive Director & Founding Partner at CSSP (Centre for Social and Sustainable Products) in Liechtenstein. CSSP is an independent research and consulting firm with a focus on sustainable financial investments, impact investments and corporate social responsibility. The FinTech portal yourSRI.com is one of the products offered by CSSP.



Whether CO₂ data, arms deals or child labour, every firm is scanned on the basis of sustainability and exclusion criteria.

Climate Prize. Oliver Oehri explains: «This technology has allowed investors to see for the first time how their investments impact the climate. The results are displayed online and within seconds.» Users simply upload their portfolios onto the website and receive, at the push of a button, a report allowing them to discuss (and reduce) the effects of their investments on the climate, and compensate for these effects with high-quality projects. This will not only reduce CO₂ emissions, but also big investment risks in investor portfolios. This year, the company has expanded its offering to provide for greater transparency in the funds market. And private investors, asset managers, pension funds and banks can now calculate their ESG and carbon values by way of an online portfolio «QuickCheck».

YourSRI.com provides free access to ESG criteria and the final CO₂ footprint ratings for more than 80% of the European funds market. «Every day, we check around 4,300 funds,» asserts Oehri. This corresponds to more than four trillion euros in managed customer assets. yourSRI.com has built a second platform for the US market which examines 60% of all Ameri-

can funds, or the equivalent of eleven trillion dollars. To check funds, ESG data from MSCI ESG Research (the world's largest provider of sustainability analyses) is combined with CO₂ data from ISS-Ethix and financial figures from Thomson Reuters Lipper in real time. And the best part is that requesting the ESG data is free of charge. An initial record contains checks for violations as defined by UN Global Compact. Possible violations include arms deals or child labour. In a second record, impacts on the climate and the ecological footprint are screened.

It couldn't be easier: «We use the traffic light system,» explains Oehri. «For A, AA and AAA ratings, the light shines green.» If the light shines yellow or red, users can, at a single click, have a closer look at the analysis. «The standard, in-depth report of 13 pages costs 650 euros for the climate analysis, and 850 euros for the ESG screening,» says Oehri. Moreover, investors can now access [yourSRI Professional](http://yourSRI.com), a portal for individual, customised solutions.

Further information
www.yourSRI.com

The Sun Kings of Zizers

Horizon, the world's first foldable solar roof, allows surfaces that are already in use to serve a second purpose – the clean production of energy. This is all achieved without disrupting day-to-day operations.



Gian Andri Diem (left) and Andreas Hügli, dhp technology Zizers.

Inventors Andreas Hügli and Gian Andri Diem of dhp technology live on the sunny side of life – in the truest sense of the term: their 2016 Climate Prize submission, the Horizon foldable solar roof, has overcome a major hurdle. In September, after several months of tests, the first third of their solar power system over the wastewater treatment plant in Chur was put into operation. The project was completed by IBC Energie Wasser Chur (builder) and the city of Chur (electricity consumer). For Franco M. Thalmann, Director of Electricity & Operations at IBC Energie Wasser Chur, the choice was a good one: «dhp's technology and startup team were more than convincing and offers Grisons, as well as the entire Rhine Valley, an excellent way to create a variety of new jobs.»

Andreas Hügli is delighted: «Next year, once completed its full size of 6,400 square metres (about the size of a football pitch), the Horizon solar power station will boast 636 kilowatts peak (kWp) of installed power, and thus be able to cover around

20% of the annual electricity needs of the plant, including sludge drying.» It seems that the world's first foldable solar roof is predestined to cater to the extraordinarily energy-intensive activities of wastewater treatment plants.

It is the flexible nature of the foldable solar roof allows operators to utilise a plant's space in two different ways. For operational reasons, the wastewater basins must be accessible at any time. A permanent solar power system is therefore not an option. Another advantage of Horizon: «the flexible roof reduces the amount of direct sunlight. In the event that this leads to a reduction of algae, maintenance costs can be saved. This analysis is the subject of next year's operation monitoring,» declares Gian Andri Diem. He also sees another reason for the major potential of working with waste-water treatment plants in the future: «Many wastewater treatment plants in Switzerland must incorporate a fourth stage of treatment to meet the requirements of the new Water Protection Act.»

This will cause yet another spike in energy consumption. «By incorporating foldable solar roofs at the same time as the new equipment, operators can complete the expansion in an energy-neutral manner,» says Diem. In other words, with over 600 wastewater treatment plants throughout Switzerland, there is the potential for a CO₂-neutral solar electricity production of 60 gigawatt hours per year, even if only the areas and locations that are suitable are taken into consideration.

And that is not all: «We can also see potential for our solar roofs in parking areas,» affirms Hügli. According to various surveys, around 500 gigawatt hours of electricity could be produced, with solar power in parking areas all over Switzerland. But customers are not just lining up in Switzerland: «The Korean state-owned energy supplier Kepco is interested in building a test facility,» beams Hügli. The future looks bright for him and his business partner Diem, as there are unused parking areas everywhere – and the pair have already had their innovative foldable solar roof patented.

«Our system also provides added value to parking areas,» declares a confident Hügli. He finds it entirely plausible that thanks to Horizon, car park operators will be able to charge their customers more for a place in the shade when temperatures soar. «Soil will also be conserved,» he points out, «as we use surfaces that are already being used for other purposes.» The foldable solar roof can also promote e-mobility. Building an electrical infrastructure in parking areas is never cheap. «With Horizon, the charging infrastructure for electric vehicles can be installed inexpensively in the support structure, without the need to lay additional cables,» explains Diem.

Further information
www.dhp-technology.ch



Horizon, the world's first foldable solar roof, automatically extends or retracts its individual components depending on the weather. The folding system is based on ropeway technology.

The advantages of Horizon

Conventional, permanent solar panels must brave snow, hail and storms. The foldable solar roof is different: thanks to a control panel with a built-in meteorological algorithm and the data from the local weather station installed on the system, the roof's individual components promptly and automatically retract into the garage or extend back into the open air, as

required. «We provide maximum efficiency even in the winter, as our solar panels are never covered with snow,» says Hügli. Horizon is designed to be lightweight and movable – its folding system is based on ropeway technology.

One basic unit is 55 metres long and 17 metres wide. Individual modules can be

attached to either the length or width as needed. Hügli: «Using various colours and materials such as steel, concrete and wood, architects can customise the appearance of support structures and façades and thus increase the value of industrial plants. We've created a new category for these solar panels: infrastructure-integrated photovoltaics.»



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In Zurich, e-cargo trikes can carry up to 300 kilograms of goods, emission-free and without having to wait in traffic jams.

The bicycle couriers of the future

From same-day delivery to city logistics: ImagineCargo deploys cargo bikes powered by renewable electricity and capable of carrying up to 300-kilogram loads.

In the beginning, ImagineCargo was focused on the «bike to train» transport solution. By combining inner-city bicycle couriers with transport by train for longer stretches between two cities, it has been found that a parcel carried by ImagineCargo generates 99% fewer CO₂ emissions than that which is generated for the same parcel by a carrier such as FedEx, UPS or DHL. Their system is simple: bicycle courier A picks up the parcel from the sender and takes it to the train station. The parcel travels to its destination city by train. Once the parcel arrives, bicycle courier B picks it up at the train station and delivers it to its recipient. This was the idea that allowed ImagineCargo to take home the 2014 Climate Prize (start-up category). And their system is now being used in around 30 cities in three different countries.

According to the Swiss foundation my-climate, CO₂ emissions are often heavier than delivered parcels. When travelling 800 kilometres, a 5-kilogram parcel will generate up to 12 kilograms of CO₂. Considering that online trade is booming, with

more and more people purchasing countless products both in Europe and overseas (and in many cases, returning them), the possibility for reducing CO₂ emissions is enormous. ImagineCargo is a perfect example of how a company can develop its basic idea to win the Climate Prize, and then use city logistics to proactively take its activity to the next level. Their project involves an alternative to motorised, fossil fuel-powered city logistics: electric cargo (e-cargo) trikes. These trikes can transport up to 300 kilograms of goods within city centres.

The project, backed by Engagement Migros, is currently being tested in Zurich. «We continually upgrade our cargo trikes to make them as efficient as possible, and are currently developing an IT structure for a logistics network that can be expanded to cities all across Switzerland,» declares Christoph Berger-Schauer. A bicycle aficionado, Berger-Schauer is in charge of communication at ImagineCargo. The company works closely with the my-climate funding programme. Owners of

cargo bikes or trikes that are powered by renewable electricity can take advantage of annual compensation from the sale of CO₂ certificates, allowing them to cover some of their acquisition costs. By choosing this method for transporting goods, private individuals and business will contribute to less noise and exhaust fumes, improved air quality and more space on the streets.

The electric cargo trikes will help lessen the strain placed on public infrastructure by last mile transportation and limit the impact of motorised cargo transport on inner-city neighbourhoods. It hardly comes as a surprise that the innovative minds at ImagineCargo are already tinkering with new ideas for the future. Comprised of logistics, bicycle delivery and sustainability specialists, the ImagineCargo team boasts years of experience and expertise. «We currently offer same-day deliveries to the customers of a retail company in Zurich, and hope to expand this service to the whole of Switzerland,» explains Christoph Schauer-Berger. Orders placed in a shop before a certain time on a business day are delivered that same afternoon or evening by a bicycle courier.

Some things can even be done on an international scale. «We're also looking into opportunities abroad,» says Berger-Schauer, «such as the development of a sustainable transport system that delivers coffee from Peru to end customers by sailing ship, rail and trike.»

Further information:
www.imaginecargo.com

Focus: Climate resilience

David N. Bresch obtained a PhD in atmospheric physics from ETH Zurich. Since March 2016, he has been Professor of Weather and Climate Risks at ETH Zurich's Institute for Environmental Decisions. We asked him three questions about climate resilience.



David N. Bresch, PhD, Professor of Weather and Climate Risks at ETH Zurich.

Professor Bresch, you recently gave a captivating speech («Climate Resilience – A Competitive Advantage») on the levers we have as a society for climate change and adaptation, and the new avenues to explore. Why is climate resilience more important than ever?

Climate resilience is the ability to deal with climate-induced shocks. It is an important ability in light of the expected global warming and the resulting weather events that will happen more and more frequently. In 2017, the Bondo landslide and the hailstorms in Thun and Ticino once again demonstrated the power that can be unleashed by nature. Densely populated with large concentrations of material assets, Switzerland is particularly vulnerable to extreme weather, the impact of which can be devastating for both people and property. We must therefore step up our efforts and increase awareness to protect our

residential areas, infrastructures, companies and households from the effects of climate change.

How, in light of climate change, must approaches to economic development change?

Economic development must become «climate compatible». Climate protection and climate change adaptation must become integral parts of any economic plan. This includes the reduction of greenhouse gas emissions as well as greater protection against natural phenomena. Adaptation strategies are a must. It is cheaper to invest in measures that enhance climate resilience than to learn the hard way by suffering damage. Companies that have taken appropriate measures and that, as a result, are unharmed by weather events have a distinct advantage over companies whose operations are impaired or completely crippled by damage incurred by a natural disaster.

What is the role of insurance companies in all of this?

Financial service providers are being called upon to invest funds in such a way that encourages the transition to a low-carbon economy. Insurance companies, in particular, can support the terms of the Paris Agreement by no longer insuring business sectors whose activities are harmful to the environment. Where weather risks are rising due to global warming and become predictable events with a high probability of occurring, the option of insurance is at risk. Climate resilience and climate compatible business development will help ensure the remaining risks can still be insured.

What is Zurich doing?

Using insurance and investments to help with the transition to a climate-friendly society. (Zurich Group – November 2017) goo.gl/pgVifw

Ambitious goals in the area of impact investing. (Zurich Group – November 2017) goo.gl/jm4Fam

The Zurich Natural Hazard Radar – Digitisation that benefits society



In 2015, Zurich Switzerland introduced the Natural Hazard Radar to help individuals and companies in Switzerland to understand and protect themselves from natural hazards. Zurich teamed up with experts from Geotest AG to develop this free online tool. Existing federal and cantonal hazard maps are overlaid with Swiss postal service records for the data modelling. This allows hazard analyses right down to specific addresses. Protective measures have been formulated for individual risks arising from natural hazards to improve resilience in a cost-effective manner. A detailed natural hazard guide offers useful information. Zurich will have an even stronger focus on climate resilience in the future and is planning to add further risks to expand the natural hazard radar. More information on these developments will be available in the second half of 2018.

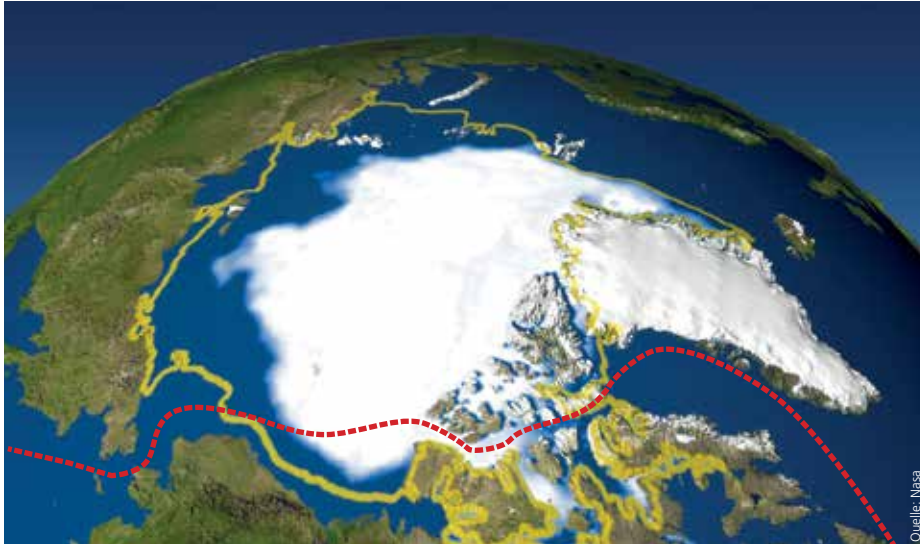
www.zurich.ch/naturalhazards

MeteoSwiss Swiss Climate Scenarios (in German) goo.gl/wmuAAd

Swiss Climate Factsheet (in German) goo.gl/jBhLXH

Climate Scenarios for Switzerland
www.ch2018.ch

Change the Picture – our initiatives at a glance



Global warming: The Arctic ice is melting, the sea level is rising – Northwest Passage free of ice in 2016.

For Zurich Insurance Group, addressing the changing climate is of central importance. After all, hedging current and future risks is, and will remain, our core business, and our responsibility.

A global commitment

In 2008, Zurich inaugurated a worldwide climate initiative based around three core activities:

- Supplying information on the risks and consequences associated with climate change
- Reducing our own CO₂ emissions
- Developing products and solutions aimed at protecting our clients

Climate protection and adapting to change are two inseparable strategies for dealing with climate change. Sustainable measures are important to drive both the necessary reduction in greenhouse gas emissions and the adaptation to climate change.

Zurich Climate Dialogue – since 2009

At Zurich Switzerland, we have long since

adopted sustainable and future-oriented environmental and corporate policies, ensuring eco-friendly behaviour is integrated into our business processes. Nevertheless, we found a lack of awareness in the market and among the population for the consequences of climate change. The complexity of the issue, and the fact that experts differed on the facts, was not helping the matter. Having recognised a need for more information, we developed a dialogue platform in 2009 where specialists and experts could present their views and outline the effects of climate change on Switzerland and its economy. In the same year, management decided to invest refunded CO₂ steering tax contributions into the Zurich Climate Dialogue.

Since then, we have launched a number of innovative projects, including the Zurich Climate Prize for Switzerland & Liechtenstein and the Zurich Natural Hazard Radar. And thanks to our annual climate magazine, the permanent exhibition «Change the Picture» in the Umwelt Arena and the new «Wetterfroscher» education pro-

gramme, we have developed instruments that help create widespread public awareness around climate change.

March 2017 – «Wetterfroscher» Education Programme

Since 2017, Zurich is supporting the «Wetterfroscher» education programme devised by Meteotest, and has co-authored the module's «Weather and Climate» and «Natural Hazards» sections. The programme is geared toward 10–13 year-old schoolchildren. «Wetterfroscher» is the first programme in Swiss schools that Zurich partners with. A comprehensive student book (in German) explains climate and weather phenomena in a way that is both playful and easy-to-understand, and encourages observations and experiments. By discussing weather-related issues, they learn how to interpret the effects of climate change, identify potential hazards and protect themselves. More information: www.wetterfroscher.ch

August 2017 – Klimaplatform der Wirtschaft Zürich

Klimaplatform der Wirtschaft Zürich is a new network founded in August 2017. It aims to demonstrate the commitment of companies to sustainability and promotes the discussion of actual sustainability projects. Zurich Switzerland supports the network as a founding member, actively contributing to the dialogue on climate protection.

Innovative companies, business associations and the public sector all work together in the Klimaplatform der Wirtschaft Zürich. At the regular business lunches, successful sustainability projects are presented. The platform is designed to promote networking and knowledge

sharing between decision-makers. On 15 November 2017, Zurich Switzerland introduced its Climate Dialogue in this forum. More Information: www.klimaplattform-zuerich.ch

Zurich Climate Prize from 2009 to 2016: 499 projects with one objective – climate protection

The Zurich Climate Prize was awarded to projects which help to reduce CO₂ emissions by decreasing resource consumption, increasing energy efficiency or bringing about a change in behaviour. An independ-

ent jury of professional experts and business representatives evaluated submitted projects according to predetermined criteria and selected the winners. Since 2009:



Found out more about the winners and their projects at www.climateprize.zurich.ch

Zurich Climate Dialogue – handover of responsibility



Roland Betschart

I feel lucky to have been able to develop the Zurich Climate Dialogue since 2008, and to oversee 8 editions of the Zurich Climate Prize in the process. Looking back, I am proud of the nearly 500 projects entered and validated and the 39 prize winners. These projects are evidence of Switzerland's diverse approaches to climate protection. The topic has gained visibility in Switzerland.

I was thrilled to meet the people behind the projects with their strong personal commitment. At all times, I enjoyed overcoming reservations and lobbying for our initiative.

After 28 years with Zurich, the last 8 in charge of the Climate Dialogue, I am now stepping down to focus on my personal projects. I will pay close attention to the evolution of the Climate Dialogue, knowing that with Barbara Jordan, it will be in the best of hands.



Barbara Jordan

Over the past few years, great strides have been made in climate awareness and development. What was innovative 8 years ago is considered the norm today and is widely accepted.

The adaptation to increasingly frequent weather events is one of the most vital tasks of the future. As insurers, we have an active role to play in this process. Only when we know where the danger lies can we protect ourselves adequately. Zurich is committed to strengthening its focus on the adaptation to climate change.

After two years working on the Climate Dialogue, I look forward to taking over the reigns, and to further develop meaningful activity. I would like to thank Roland Betschart for his development work, his commitment and his dedicated handover.

Masthead

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