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## The weather forecast 38 years from now

Switzerland is just like everywhere else when it comes to climate change. The melting glaciers and rising temperatures, which have actually risen above the global average here, bear testimony to that. With its highly complex nature, climate change represents a kind of test case for the "Swiss system". The key question is whether it will succeed in taking adequate measures quickly and decisively enough to curb climate change and alleviate its impact.

By Marc Lettau

Switzerland is just recovering from the sort of climate change that takes place every year. Autumn is over. The frost has killed off the last geraniums not relocated to the cellar in time. The early morning is no longer filled with the twitter of birdsong but the sound of scraping as commuters remove ice from their car windscreens with numb fingers in the pitch black. The summer wardrobe has long since been put away and winter woollies are in season.

A change of clothing of a different kind is underway in the Swiss mountains. While people are pulling on warm attire, some glaciers and snowfields are disrobing. It has become a familiar sight to see glaciers covered with a light fleece jacket in early summer. This sheet is intended to prevent the ice mass from becoming overexposed to the summer sun and melting. It is then removed in late autumn before the first snowfall. The fabric protector relies on the principle of hope. How beneficial it actually is remains unclear.

Very few Swiss enjoy a permanent view of the craggy ice of a glacier. But even those living in the lowlands see glaciers as an iconic feature of Switzerland. So, the thought of a glacial meltdown also sends a shiver down the spine of city dwellers. There was particularly bad news this year. Such dramatic shrinkage as in the 2010/2011 period had never been measured before. 93 of the 97 glaciers under observation retreated further. A record figure was recorded for the Rosegg Glacier in Grisons, which lost 1,300 metres in length. With the exception of a small number at very high altitude, all glaciers are set to disappear completely before the end of the century. It is not luscious alpine meadows that lie beneath, but grey scree landscapes.

The disappearance of the glaciers provides tangible evidence that Switzerland is not escaping the effects of climate change. However, this is just one piece in the jigsaw of the strategy presented by the Federal Council this year for dealing with

climate change in Switzerland, as rising temperatures will eventually impact upon all walks of life. The Federal Council anticipates a higher incidence of extreme weather conditions, such as periods of heat or heavy rainfall with flooding, pressure on indigenous flora and fauna, negative effects on human health and major changes in Switzerland's water balance. The action that needs to be taken in the Federal Council's view to minimise the negative consequences has only been outlined vaguely so far. The government is nevertheless committed to producing a list of specific measures.

### New arrivals are forcing out indigenous species

It is nonetheless already clear that the management of climate change presents a complex challenge for Switzerland because our country is extremely diverse topographically and climatically within a small area. There is a high degree of bio-



The Morteratsch Glacier in the canton of Grisons has retreated by more than two kilometres in the last 100 years



diversity, for example, because we have animals and plants that have adapted to various altitudes. While the climate changes, the topography does not. Animals and plants that flourish at a particular altitude must move into higher regions provided they are able to do so. Urs Tetter, head of the biotope and species department at the environmental organisation Pro Natura, sees bad times ahead for mountain hares and wood grouse: "Their potential habitat is growing smaller. We expect these species will die out in certain regions." The OcCC (Organ consultatif sur les changements climatiques), which plays an extremely important role in the climate debate in Switzerland as the expert committee advising the Federal Council, has highlighted the position of the alpine ibex, one of the most magnificent alpine residents. It too will seek to extend its habitat into higher and higher locations provided the mountains are actually tall enough. If they are not, "local populations may well break up", concludes the OcCC. The prospect of new species for which Switzerland was previously too cold resettling in the Swiss lowlands also poses a threat to indigenous species as it will put them under pressure. The scientists comment on the anticipated speed of change in the OcCC reports:

"The pace of the migration of foreign species to Switzerland will increase dramatically over the next 50 years on account of the rapid rise in temperatures."

#### **Water, wind and weather conditions**

The model calculations used by the climate experts focus on the assessable period up to 2050. They do not concentrate on a scenario well into the future, but rather on the climatic conditions that will shape the lives of the children being born today when they reach middle age. Switzerland's role as "Europe's water tower" will also change. Since the glaciers are disappearing and the snowfall line will rise by over 300 metres, water levels in the rivers will fluctuate much more than in the past. The balancing effect of the gradual melting of the snow is set to decline because rain instead of snow will fall more frequently during the wintertime. This will result in more frequent flooding during the winter months, greater water shortages and dry periods in the summer and a lower groundwater level. A new competitive situation will also emerge among water users. Drinking water plants, hydropower stations and farmers wanting to water their crops will rival one another, the OcCC concludes: "The water supply will no longer be able to meet the demand ev-

erywhere or at all times." Tension is also foreseeable if, of all things, eco-friendly hydropower stations produce less power because of water shortages. Power station operators already want to be able to dam rivers in protected natural environments even now, just as they will in the future. And advocates of nuclear power are taking advantage of this fact – in spite of Fukushima – to recommend the construction of new nuclear power plants. Nuclear power station operators are nevertheless aware that rising river temperatures will also make their lives more difficult. In the extremely hot summer of 2003, the water volumes available for reactor cooling were so low and warm that the output of the nuclear piles had to be reduced.

#### **As it gets warmer, the growing season will become longer**

A common argument put to those concerned is that as it gets warmer the growing season will become longer and a greater harvest will be produced in some fields. However, this outlook is flawed in the view of the Chairman of the Swiss Farmers' Union, Hansjörg Walter (SVP, TG), who is also the incumbent President of the National Council. Walter believes that, besides less certain water supply, the extreme weather conditions will have a predominantly negative effect on



In May 2005, the Stieregg mountain hut suddenly found itself teetering on the edge of a cliff. An enormous moraine had collapsed because the Lower Grindelwald Glacier had shrunk massively. The hut had to be torn down



agriculture particularly since risk insurance for the new dangers is currently unaffordable: "Climate change increases production risks for farmers." Walter also sees challenging times ahead because climate change will affect production prices worldwide: "We anticipate much greater fluctuations." He also foresees problems arising in the fields themselves. The growing season will indeed become longer, but agricultural researchers also expect pathogens, weeds and vermin to be able to reproduce more quickly and effectively. There may be two to three instead of just one or two generations of the European corn borer (*Ostrinia nubilalis*) and the codling moth (*Carpocapsa pomonella*) per season in future. The ravenous cockchafer grub – the larva of the cockchafer (*Melolontha*) – is already no longer appearing just every three years but instead at shorter, irregular intervals.

#### Sweating and coughing

And what about people? The OcCC says that people living in Switzerland will generally get off lightly: "Assuming that the temperature rises remain within the anticipated limits, the expected consequences of climate change for Switzerland by 2050 would appear to be manageable without serious problems for society as a whole." This is nevertheless immediately qualified by a "but". While the winters will become milder and air quality during the wintertime will improve as less heating will be required, the summer will present greater problems with increasing ozone pollution, a longer pollen season and heat waves in the cities where extreme heat pockets could form. Great heat also means increasing mortality. 1000 additional deaths directly related to the heat were recorded in Switzerland in the hot summer of 2003. It is therefore probable that Switzerland will require much more energy for

cooling and air-conditioning systems in future if it is to retain its current levels of productivity. The OcCC forecasts that in 20 years' time power consumption for cooling and air conditioning will be twice as high as in 2000.

#### When mountains melt

He may not be everyone's cup of tea, but you will surely have heard of the Swiss entertainer and singer Vico Torriani (1920–1998). Climate change will also invalidate some of his song material. Torriani's catchy track "Alles fährt Ski, alles fährt Ski, Ski fährt die ganze Nation" (Everyone skis, everyone skis, the whole nation skis) will no longer be sung with carefree abandon in 2050 because winter sports resorts will come under intense pressure from climate change. It will have a dramatic impact on those making a living from winter tourism.

The rising snowfall line means that the slopes are increasingly snow-free and it will be virtually impossible to operate lower alpine ski resorts viably over the long term. Lower-lying winter sports resorts will also be shaken to their very foundations as many railway stations and mountain rail masts are not anchored in solid rock but in permafrost. If the zero-degree line rises and the permafrost thaws, some seemingly unshakeable mountainsides will prove to be just scree deposits frozen together. The cable car station on the Gemsstock near Andermatt, which is "anchored" into permafrost, started to move back in 1992. The Riederalp–Moosfluh gondola lift station tilted sideways in 2011. If the permafrost melts, the number of rock falls will also rise. The major avalanches at Mont Blanc (1997), Ortler (2004) and Eiger (2006), where over a million cubic metres of rock and debris



The ice cave in Valais' Rhone Glacier has been covered in a blanket to try to stop it melting rapidly



thundered into the valley on each occasion, were primarily a result of retreating permafrost.

### Return of the summer retreat

The mountains will nevertheless remain important. Researchers are expecting what the tourism industry is hoping for – greater demand for holidays in the mountains as a result of sharp temperature rises in the Mediterranean and searing heat in the cities of Switzerland's Central Plateau. The antiquated term "summer retreat" may enjoy a renaissance. The relative coolness of regions at higher altitude will become an asset. However, anyone hiking through the Alps in future will have to become accustomed to new surroundings. The Federal Office for the Environment expects that 500 to 600 new mountain lakes with a total area of 60 square kilometres will be created as a result of glacial melting.

### The debate goes on

Elsewhere, rising sea levels are threatening inhabited areas. Switzerland does not have to prepare itself for this kind of acute threat. The Zurich-based geologist and National Councillor Kathy Riklin (CVP) puts it quite plainly: "We will survive this but at a high cost." Riklin, who also chairs the OcCC, is concerned at the growing number of people "who deny the truth of climate change". While many people are aware just how serious the situation is, if the "minority of sceptics" gain a foothold the mood may swing in the other direction and Switzerland's "well-planned climate roadmap" could be jeopardised. Apathy towards important issues is nonetheless not a new phenomenon. Riklin remarks: "Issues continually arise that are critical to survival and yet people appear indifferent."

Patrick Hofstetter, head of the climate and energy department at WWF Switzerland, has no time for "climate sceptics". He believes denial of climate change is unquestionably misguided as there is nothing to suggest that Switzerland will be spared: "Climate change measurements confirm the forecasts." Temperatures in Switzerland are actually rising at twice the rate of the global average. It is therefore vital "that Switzerland relentlessly pursues the global objective of restricting the increase in temperatures to less than 2°C by 2050". If a greater increase is permitted, "then it is highly likely

to get very, very hot". In the event of temperature rises of over 2°C, there is a risk that the system will topple due to self-perpetuating effects. Hofstetter believes this would result in even more rapid climate change that could no longer be contained by man, a conviction shared by Kathy Riklin.

Hofstetter provides an example of a self-perpetuating effect: "Permafrost soils contain lots of methane. If they thaw, this aggressive greenhouse gas will be released, causing temperatures to rise exponentially." Pro Natura expert Urs Tester points to similar chain reactions. If the fens should disappear as a result of climate change, the process would also be intensified: "Fens store more CO<sub>2</sub> than all the forests worldwide. If fens are destroyed, they lose their storage capacity and large quantities of environmentally harmful CO<sub>2</sub> are released. Protecting the fens therefore helps protect the environment."

### A few killer arguments

If Hofstetter, Tester and Riklin were to sit around a table with Hans Killer, the debate would unquestionably get heated. Hans Killer, a National Councillor in Aargau and one of the spokespersons for the Swiss People's Party (SVP) on climate policy is firmly opposed to Switzerland pursuing any "special course of action with climate policy". He believes climate change can only be curbed in conjunction with the rest of the world: "It makes no sense for Switzerland to proceed with drastic measures." It will only end up being disadvantaged: "It would be ridiculous to react too frantically as Switzerland is far from one of the biggest emitters of CO<sub>2</sub>." Killer's arguments, as he concedes, are fed by "a certain scepticism towards science". He nevertheless sees that the disappearance of the glaciers and the rising zero-degree line would impact on winter tourism: "Climate change presents a real challenge for winter sports resorts." Aside from that the issue should be tackled with much more composure and "without hysterically going it alone", he says. "Slightly higher temperatures in the Swiss Central Plateau will not pose major problems."

Scientist Riklin disputes science-sceptic Killer's argument that Switzerland will not help to save the world's climate by leading the way: "Switzerland has a special social responsibility. We are privileged to be able to set a good example. If

we lead the way, we will inspire other much larger industrial nations to follow suit." Pursuing a consistent strategy with climate policy remains "absolutely crucial" for Switzerland.

### Criticism of the CO<sub>2</sub> law

Killer's SVP and many environmental protection campaigners do agree on one point – they deem the Swiss CO<sub>2</sub> law (see box) to be "unsatisfactory". Nonetheless, the reasons for this poor opinion differ. Hans Killer says that passing a CO<sub>2</sub> law and showing how important the reduction of CO<sub>2</sub> emission is while "in the same breath" giving the go-ahead for new gas-fired power plants is "completely inconsistent". The planned gas-fired power station in Chavalon will "wipe out all the CO<sub>2</sub> savings achieved on the roads thanks to tighter provisions and technical progress". The fact that the Chavalon operators want to invest in CO<sub>2</sub>-reduction projects abroad is irrelevant in Killer's view: "That's nothing but a form of indulgence trade. I'm not interested in the redevelopment of some chicken farm in Southeast Asia." It should be noted that Killer sees nuclear power as one of the viable, eco-friendly energy sources of the future.

WWF representative Hofstetter adjudges federal government and, in particular, the Federal Council to be "unsatisfactory" because while it is pursuing the right objectives and relying on correct analyses it is "dragging its heels over its commitment". The Swiss CO<sub>2</sub> law, which is "targeting modest objectives", will "in effect be undermined" by poor implementation. Hofstetter believes there is no question that CO<sub>2</sub> emissions have to be cut: the high consumption of (fossil) fuels is one of the main reasons for climate change. The curve is particularly steep in Switzerland where energy consumption increased eight-fold in the 20th century.

### Between "knowing" and "doing"

In Switzerland, general sensitivity about the future of the climate is not just determined by scientific model projections. Various uncomfortable issues are also significant:

- What consequences will the enormous financial expenditure on the management of climate change have on national co-existence?

- What conflicts will arise if this expenditure results in the sacrifice of services that citizens take for granted today?



– What additional challenges will occur if climate change drives more people from the southern regions of the world to Europe and, therefore, Switzerland?

– Is the notoriously slow-paced “Swiss system” sufficiently agile to implement preventive measures early and decisively enough to alleviate the effects of climate change and curb emissions that are harmful to the environment?

– Are there grounds to address pessimistic, instead of only optimistic, climate scenarios in Switzerland?

– And finally, in light of the complexity of the issue, is it not inevitable that ordinary citizens will concentrate on easily comprehensible everyday issues and leave climate change to the experts?

Patrick Hofstetter does not believe the Swiss people are apathetic: “I don’t think they have a devil-may-care attitude.” Environmental awareness is very high, he says, as is the “theoretical willingness” to change one’s own behaviour: “But many people don’t manage to put words into action.” They fail to do so because they are often unaware of how much can be done for the climate with very little effort. Taking action is made more difficult because of a “sense of powerlessness” over climate change: “Everyone knows that we must all make our contribution.” But too many people have shirked their responsibilities, which is why the framework conditions established by the state are “doubly important”.

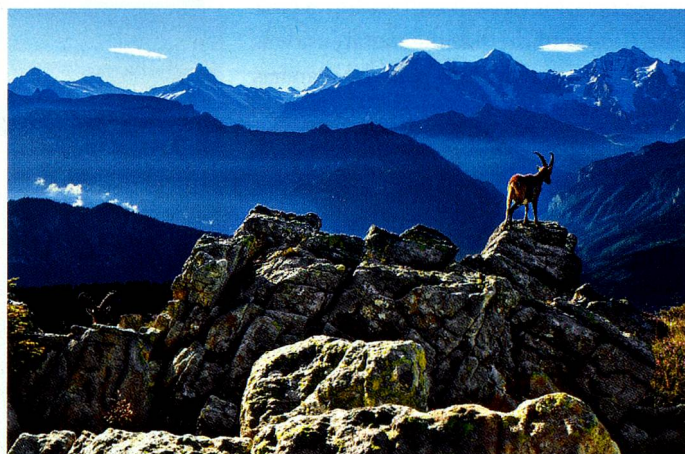
Should we resign ourselves on account

of the complexity of the issue? Kathy Riklin believes there is no choice to make: “We must endeavour to reduce greenhouse gases using all means available, otherwise the consequences will be tragic.” Tragic because it currently seems possible to restrict the changes so they are manageable, whereas doing nothing will provoke extreme climatic transformations. Science-sceptic Hans Killer is unlikely to be swayed. He does not regard climate change as an “existential problem”, not even for the farmers towards whom his party is always inclined. “Corn will still grow if it gets a bit warmer, perhaps even better”, says Killer.

MARC LETTAU is an editor at “Swiss Review”.



The codling moth: soon there will be three generations per season thanks to rising temperatures



The natural habitat of the ibex is being forced higher and higher

### SWITZERLAND IS BECOMING HOTTER MORE QUICKLY

The average temperature in Switzerland has increased around twice as much as the global average in the 20th century. The global average temperature rose by 0.6°C compared with 1°C in Ticino, 1.3°C in German-speaking Switzerland and a staggering 1.6°C in French-speaking Switzerland, and the rate of increase is accelerating. Depending on the scenario, the global temperature may increase by between 0.8°C and 2.4°C by 2050 and by between 1.4°C and 5.8°C by the end of the century. Climate experts estimate that temperatures in Switzerland will be 1.8°C higher in winter and 2.7°C higher in summer. Zurich’s climate in 2050 will be similar to the current conditions in Ticino’s Magadino plain. Basel’s weather will be comparable with that of Verona today. Climate scenarios for Switzerland: [www.ch2011.ch](http://www.ch2011.ch)

### FEDERAL GOVERNMENT ADVISORS CALL FOR DECISIVE ACTION

In 1996, federal government set up a committee of experts, who were given the task of providing advice on climate change policy and management. The “Organe consultatif sur les changements climatiques” (Occc), which is managed by the Swiss Academies of

Arts and Sciences, has become one of the leading authorities on climate policy. The Occc presented its latest report on 23 November 2012 in which the experts criticise the roadmap for the reduction of CO<sub>2</sub> emissions. The will for a global agreement on climate protection exists but the proposed timeframe is incongruous with the urgency of climate protection, they say. Firstly, the reduction of emissions needs to be pursued in a “much more targeted” way. Secondly, the additional focus on how to adapt to climate change is becoming more important than ever. The CO<sub>2</sub> law with which Switzerland aims to cut its CO<sub>2</sub> emissions by 20% by 2020 is, according to the Occc, “a first step in the right direction”. This measure is nevertheless not enough. It is “incompatible” with the objective of restricting global warming to a maximum of +2°C. By 2050, emissions must be cut by 80% to 95% compared to 1990. In the report on Switzerland’s emission reduction targets, the scientists come to the conclusion that Switzerland possesses the technical and financial capacities to decrease CO<sub>2</sub> emissions dramatically but “societal behavioural changes to ensure a sustainable way of life” are also necessary.

THE REPORT IS AVAILABLE AT: [WWW.OCCC.CH](http://WWW.OCCC.CH)