Net zero target in sight

18 September 2021

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

You are investigating potential strategies for tackling climate change with the Climate Policy group. What is your approach?

ANTHONY PATT – On the one hand, we simulate different renewable energy systems, modelling them with high temporal and geographical accuracy. This shows us what sort of quantities the various sources could produce. Building on this, we investigate, for example, how much storage capacity would be needed if Switzerland was looking to import as little energy as possible. On the other hand, we work with surveys of public attitudes. An example: to achieve climate goals, we will need to increase electromobility. We asked what circumstances it would take for people to be prepared to purchase an electric car. According to the survey, one of the biggest needs is to

be able to charge the car at home. Findings like this help to attune political decision-making to the issues people face.

You originally worked as a lawyer and environmental planning consultant. What prompted the move to academia?

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

One of your current research projects is investigating the quickest way for Switzerland to achieve significant reductions in greenhouse gas emissions. What are the key findings?

To reach the net zero target, we need to switch to renewable energies and climate-neutral technologies, whether in air travel, in industry or in our personal consumer habits. As to the question of "how", there are several different ways, which all depend heavily on political decision-making. Should emissions from livestock farming be lowered by reducing consumption, or offset using new technologies such as direct air capture of CO_2? According to our calculations, removing the generated CO_2 would result in a price increase of around 5 to 10 percent for dairy and meat produce.

Because livestock is a traditional part of Swiss culture, however, offsetting could be easier to achieve than a reduction in consumption. As another example, should our energy production be based entirely in Switzerland? That would mean we would need huge storage capacities, because days without sun or wind are not uncommon in Switzerland. But since it costs more to store electricity than it does to generate it in the first place, eliminating imports could be expensive.

Political frameworks are one thing. Do we also need to change our lifestyle in order to stop climate change?

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

Your research is supported by philanthropic individuals. What role is philanthropy playing in the search for solutions to climate change?

Private donations can provide a boost to a wide range of research questions and fast-track answers such as the one here on the question of importing energy. This broadens the field of possible approaches.

How do you see the future?

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

> "We want to play a role in ensuring that climate change is tackled as quickly and effectively as possible – so that future generations can also enjoy a wide range of opportunities."
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> **Philippe Sarasin**
> Donor of the ETH Foundation

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