

Switzerland and the Sustainable Development Goals of the United Nations from the youngSCS Perspective

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Abstract: Switzerland's commitment to the Sustainable Development Goals of the United Nations is showcased in this article with concrete examples of actions taken so far in the private and public sector. To further highlight the involvement of the chemical scientists in the implementation of the SDGs in Switzerland to date, the youngSCS also interviewed various individuals.

Keywords: Sustainable Development Goals (SDGs) · Switzerland · United Nations (UN) · youngSCS



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1. Introduction

The Sustainable Development Goals (SDGs) adopted by all United Nations in 2015 are 'a shared blueprint for peace and prosperity for people and the planet, now and into the future.'^[1]

SUSTAINABLE DEVELOPMENT GOALS



Fig. 1. The 17 Sustainable Development Goals of the United Nations, © United Nations.^[2]

1.1 Switzerland's Priorities

As a UN member state, Switzerland has committed itself to implementing the 2030 Agenda for Sustainable Development in its entirety. To this end, in 2018 the international targets were

adapted to the Swiss context. A national objective was defined for each target. In 2021 the Federal Council adopted the 2030 Sustainable Development Strategy. This set the priorities for Switzerland's implementation of the 2030 Agenda for Sustainable Development. Three priority topics were chosen among different policy areas: sustainable consumption and sustainable production; climate, energy and biodiversity; and equal opportunities and social cohesion.^[3]

1.2 The Swiss Approach to the SDGs

Here, we list examples of practices within Switzerland that contribute to some of the SDGs. This, however, is not exhaustive.

The **SDG 1** can be achieved in the chemical sector by providing quality jobs, improving working conditions, as well as overall health, nutrition and income of people so they are able to live above the poverty limit, even in Switzerland.

The **SDG 2** of zero hunger can be attenuated with the help of chemistry: research in the field of food chemistry can lead to more affordable and nutritious food. Syngenta has welcomed the UN SDGs and committed itself to directly contribute to SDG 2 – Zero hunger – and significantly support nine other SDGs.^[4] With the ultimate goal to eliminate hunger and malnutrition and contribute to the SDGs the Food and Agricultural Organization of the United Nations in Geneva collaborates among others with Agroscope, the leading agriculture research institution of the Swiss Confederation in key areas like soil fertility, agroecology and digitalization.^[5]

SDG 3 for good health and well-being is one of Roche's business priorities as the global healthcare company participates a) in the Global Access Program for HIV, *Mycobacterium tuberculosis*, hepatitis B and C and HPV testing for low- and lower-middle-income country programmes, b) in a joint statement, in collaboration with the Bill & Melinda Gates Foundation, to ensure that the world's population has access to COVID-19 diagnostics, as well as vaccines and medicines, and c) in the global strategy launched by the World Health Organization to eliminate women's cervical cancer as a public health problem.^[6] An indication of the company's engagement to **SDG 3** is the fact that Roche is the Swiss company with the most registered patents in 2023.^[7]

With **SDG 4** for quality education, the international community has reaffirmed the importance of education and good-quality training in improving the living conditions of individuals, communities and entire societies. Switzerland provides access to good-quality education for all and strengthens the links between

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basic education, vocational training and socio-occupational integration in order to boost economic and social development.^[8] When studying organic chemistry one must learn a large set of named reactions, to be able to utilize this repertoire for their own synthetic challenges. Learning those reactions is fundamental, but also hard work. With ReactionFlash, a free app for iOS and Android, learning is gamified, with flash card quizzes for 550 named reactions. ReactionFlash is provided by Elsevier and was developed in cooperation with Prof. Erick Carreira and his group.^[9]

Towards quality education and reducing inequalities, young-SCS members have written an article in French and German about chromatography in the Swiss girls' magazine 'Kaleio' and in CHIMIA in English.^[10]

Steps towards achieving **SDG 5** from industry: Firmenich SA received top-recognition by *Economic Dividends for Gender Equality* (EDGE) for accelerated global efforts on diversity, equity and inclusion. Firmenich, now dsm-firmenich, has reached EDGE Lead certification, the highest obtainable level of certification, for its efforts on diversity, equity and inclusion in Brazil and Mexico. It is the first company in the industry and the seventh in the world to receive this coveted certification. EDGE is the leading global standard for gender equality in the workplace.^[11]

dsm-firmenich also contributes to **SDG 6**, focusing on enhancing water security, through the implementation of water saving projects. Their products are manufactured and transported to customers in concentrated formulas, requiring minimal water use.^[12]

Towards affordable and clean energy production (**SDG 7**) we ought to mention the well-known Grätzel cells or mesoscopic dye-sensitized solar cells (DSC). Developed by EPFL-professor Michael Grätzel, DSCs convert light into electricity through photosensitizers – dye compounds that absorb light – and inject electrons into an array of oxide nanocrystals which subsequently are collected as electric current. DSCs are already being used in skylights, greenhouses, as well as glass facades, such as those adorning the SwissTech Convention Center. In addition, lightweight flexible versions of DSCs are now commercially sold on a large scale for electrical powering of portable electronic devices such as earphones and e-readers, as well in the *Internet of Things* by using ambient light.^[13]

Switzerland is already well advanced in its goal of ensuring sustainable and broad-based economic growth, full and productive employment, and decent work (**SDG 8**). To foster the employability of its members and achieve SDG 8 in the long run, youngSCS regularly organizes visits of the various SCS partners in Switzerland. Through digitalization as well as education, research and innovation, the Confederation increases labor and resource productivity, competitiveness and employment, thereby achieving sustainable economic growth.^[14]

In Switzerland, the main elements helping to reduce economic and social inequalities (**SDG 10**) are its education system, social partnership, high employment levels, social security system, cantonal means-tested social benefits and taxation at progressive rates. Switzerland uses targeted programs to promote the integration of people with disabilities or foreign nationals, for example, including the implementation at cantonal level of the UN Convention on the Rights of Persons with Disabilities and the Swiss Integration Agenda. Thus, it also endeavors to further strengthen the opportunities for participation in and shaping of social development and decision-making processes.^[15]

As part of its international cooperation, the Swiss Confederation also commits to sustainable, low-carbon and resilient building methods (**SDG 11**) abroad. The rebuilding of infrastructure is also one of the key areas of activity under the Confederation's humanitarian aid programs.^[16] Moreover, Swiss Railways (SBB) is taking on a pioneering role in making Switzerland a nation of sustainable travel. With around 3,000 km of network used by more

than 11,000 trains on a daily basis, SBB makes an essential contribution to sustainable development. This is not just thanks to its environmentally friendly trains. SBB is also pioneering role in many other areas like circular economy, sustainable energy production and nature conservation; thus, is classified as 'Level III – Leading' in the Swisstainable sustainability program, forging ahead and taking on a leadership role in making Switzerland a sustainable travel and holiday destination.

Many Swiss companies are actively engaged in circular economy initiatives, promoting the sustainable use of resources and minimizing waste (**SDG 12**). Nestlé, a Swiss multinational food and drink company, set itself the goal to make all its packaging recyclable or reusable by 2025.^[17] Academic institutions like the University of Neuchâtel encourage mobility with specific policies such as free-to-ride bicycles, bicycle repair workshops managed by students, and low-cost car-sharing facilities using Mobility vehicles. Across the UniNE campus, one finds Ecopoints, mini-recycling points located in each building, as well as boxes provided for recycling pens.^[18]

Examples of climate action (**SDG 13**): Sika monitors its greenhouse gas emissions as part of the environmental responsibility the company has for climate. HOLCIM has set out a clear pathway to net zero. By offering low-carbon products and by enabling smart design systems, they support the shift to more carbon-efficient construction.^[19] Nestlé strives for net zero emissions and deforestation-free supply chains and to advance regenerative agriculture at scale.^[20]

For **SDG 14**, life below water, here is one of the latest developments at EPFL. An artificial intelligence system developed at EPFL can produce 3D maps of coral reefs from camera footage in just a few minutes. It marks a major leap forward in deep-sea exploration and conservation capabilities for organizations like the Transnational Red Sea Center. The system can produce several hundred meters of 3D maps of coral reefs in just a few minutes from underwater images taken by commercially available cameras. It can also classify corals by recognizing certain features and characteristics. The research is detailed in a paper in *Methods in Ecology and Evolution*.^[21]

Nestlé is working to help safeguard natural resources, in particular forests, which support much of the planet's biodiversity. This is done through landscape initiatives as part of the company's Forest Positive strategy and Global Reforestation Program, as well as initiatives dedicated to water stewardship, and by sourcing ingredients that are certified deforestation-free^[22] (**SDG 15**).

As regards promoting peaceful and inclusive societies (**SDG 16**), Switzerland supports clearing contaminated areas, educating about risks, and assisting victims, thus increasing the security of communities affected by anti-personnel mines, cluster munitions, and explosive remnants of war. In addition, Switzerland has helped strengthen peace processes and the confidence of populations in institutions and promote the protection of civilians in armed conflicts by fostering dialogue, the rule of law and respect for human rights and international humanitarian law.^[23]

The SDGs can be fully realized only by global partnerships (**SDG 17**) and collaboration between countries, businesses and organizations, mobilizing and sharing all available resources, without leaving anyone behind. On the 4th of May 2022 the Federal Council adopted Switzerland's second voluntary national review on its implementation of the 2030 Agenda. The *SDGital2030* website was launched that day. "The global community needs diversity and innovation to help our world develop more sustainably", said Ignazio Cassis, President of the Swiss Confederation 2020 – 2022. Anyone can help make the Agenda's 17 goals a reality, as the examples from Switzerland's different language regions show.^[24]

2. Interviews

Opinions expressed within this article belong solely to the interviewees and do not reflect the opinions and beliefs of the organizations, companies, or their affiliates.



Dominic Egger

DE is currently pursuing a PhD in chemistry at ETH Zurich. He has been a teaching assistant for a variety of lectures and is organizing a practical course in synthetic organic chemistry for over 120 1st year chemistry students at ETH. He is an active member of the Swiss Chemistry Olympiads, and part of the Scientific Committee for the International Chemistry Olympiad

2023 held in Zurich, Switzerland.

What is quality education for you? In the context of chemistry in Switzerland, I view quality education as providing young adults with access to the best possible education in chemistry. And simultaneously equipping them with a general skillset that enables them to tackle the problems of modern science and society.

How have you personally contributed to it? I think that my contributions to chemistry education span over a broad range. On the one hand, there are the teaching obligations as part of my graduate studies, both as teaching assistant and the responsibility of organizing a lab course for 1st year Bachelor students. On the other hand, there's my voluntary engagement for the Swiss Chemistry Olympiads, an annual chemistry competition for Swiss high school students. Ever since I participated myself in 2016, I have been involved as a teacher, exam author, event organizer, and for many years now have been serving as the actuary and vice-president of the association behind the Olympiad. Every year we have hundreds of Swiss high school students from all four language regions participating in the 1st round of the Olympiad. Albeit being a competition, Chemistry Olympiads are an extracurricular educational program, fostering exchange between young people and giving them an opportunity to get in touch with different Swiss universities. Through the year, we enable them to see aspects of chemistry, often beyond the curriculum taught at Swiss high schools. What I personally find very cool is that every year students undergoing a vocational training as chemistry technicians participate too. Some of the latter, advance to the international competition, outcompeting some of their peers from Swiss high schools. This really showcases the duality of the Swiss educational system and its competitiveness on an international level. Speaking of the international competition – 2023 marked a very special year for the Swiss Chemistry Olympiads. For the first time Switzerland hosted the International Chemistry Olympiad. 89 different countries were hosted at ETHZ last July. I had the honor of serving as one of the members of the scientific committee for IChO2023, where I was mainly involved with curating the scientific content, like the preparatory problems and the final exam questions. It fills me with pride that my work in the committee has helped to promote chemistry education for students.

Where would you see challenges/threats/opportunities to achieve this goal? What I see both as a great challenge and opportunity towards quality education is the continuous adaptation to the rapidly developing technology in our digital world. *e.g.* the currently on-going debates about the use of AI-tools in universities. While I believe that technology plays a crucial role in making education more accessible to more people, both students and educators will have to learn how to use these new technologies wisely in the context of education.



Dr. Tara Forrest

TF did her PhD and Post Doc in Analytical Chemistry at the University of Geneva and is currently working in the same field at Eagenos Sciences in Switzerland. Active in the youngSCS since 2020 Tara kindly agreed to share her view on the topic. She is interested in improving the characteristics of materials for ion-selective electrodes using synthetic approaches and in applied

aspects of electrochemical sensors for environmental and bioanalytical applications.

What were the challenges when working to achieve 'Good Health and Well-being'? Developing a new sensor is not a big deal; it is important that it is stable, robust, and easy to use in different contexts. One major challenge today is to develop sustainable sensors, which contain the least amount of plastic and produce the least amount of waste after use. An additional challenge is to automatize the sampling and the analytical part: a lot of manpower and time is still required.

How did you contribute towards this goal? During my PhD in the Bakker group at the University of Geneva, I worked in a team which developed different sensors for various purposes; among them the measurement of NO₃ in fresh water. One of my sensors was also used to test the water of Lake Geneva. I am still working on this field and trying to develop new sensors for cholesterol or glucose measurement.

What impact has this project had on your personal development? The most emotional memory I had from the project is to see my sensor put deep into the Lake Geneva. I was proud of my work because it was used for something concrete but, at the same time, I was scared to lose the sensor in the bottom of the lake.



Patrick W. Fritz

PWF is a PhD student at the University of Fribourg, Switzerland in the group of Prof. Ali Coskun where he works on synthetic organic materials chemistry for energy, separation, and catalysis applications. PWF has been nominated as one of the CAS Future Leaders 2024.

What are partnership goals for you? At the beginning of my PhD, I did not intend to be as actively involved in national/international organizations as much as I am right now when I started my PhD. I fell 'victim' to the endless motivation of people around me, such as Jovana V. Milić, who encouraged me to become active in the community. After having helped with the organization of a conference for young chemists, my intentions quickly evolved and I became part of national and international networks where I had the opportunity to collaborate, learn, and grow. When I joined, I did not have any personal goals in mind. I was mostly focused on the bigger picture in helping young chemists in Switzerland and Europe be heard and trying to improve the public's view on chemists and chemistry. I believe that all of this is achievable, particularly through recent efforts in further improving international relations of the youngSCS by engaging with other networks in joint projects or by participating in each other's conferences and on an international level by engaging more with leading companies and supporting EU-wide efforts.

What are the biggest challenges and threats? On the one hand, young organizations are often not considered in the same regard as other subgroups of the same society and getting funding is often faced with much more scrutiny than necessary. It should be noted though that this has improved significantly over the past years. Another, probably bigger issue here is how I got involved in the networks. I was directly approached by highly motivated mem-

bers of these societies and was encouraged and supported throughout my time. Not everyone is put in such a privileged position, and we have at times had problems engaging with potential members since they often don't know what the networks are doing and how they could contribute. There is certainly a lot in terms of outreach we can work on and improve. Volunteering to such a capacity is quite taxing, however, I was lucky enough to have the full support of my PI Ali Coskun. One has to consider the commitment – particularly the time commitment – engaging in such networks can have and yet Ali supported me at every step of the way providing advice when needed and encouraging me at times of adversity.



Prof. Dr. Barbara Rothen-Rutishauser

Prof. Rothen-Rutishauser is currently the chair of BioNanomaterials at the Adolphe-Merkle Institute, University of Fribourg. With her colleague Prof. Alke Fink, she was elected co-vice dean of the Faculty in January 2024. In addition, she is the equal-opportunities faculty-delegate of the NCCR Bioinspired Materials and a member of the equal opportunity committee of the Faculty of Natural Sciences and Medicine, University of Fribourg.

What were the challenges when working to achieve 'Gender Equality'? I became the faculty delegate for the advancement of young researchers and women of the NCCR Bioinspired Materials (<https://www.bioinspired-materials.ch/en/>) in 2014. One of my first thoughts was that nowadays, it is no longer necessary to provide additional support for female researchers. However, the more I work in this role, the more I realize that we are still far from achieving gender equality. Female researchers face a major hurdle when it comes to making the first step up the academic ladder as postdocs or rising further up in the hierarchy. They lack confidence in the professional role, and many of them leave research. I always had support from my family and mentors, who were there to encourage me to stay in academia and to take new chances; especially when I doubted myself. However, I have seen and still see a lot of women who do not have that same support.

How have you contributed towards this goal? The vision of the NCCR Bio-inspired Materials is to offer and promote equal opportunities for all participants and to establish itself as a best-practice model for the advancement of young, female scientists, and the integration of women in natural and life science disciplines.^[25] I contributed to the NCCR equal opportunity program with my personal experience and initiated several activities such as round tables. Such events are organized over lunch, in a friendly atmosphere, to discuss topics such as gender equality, unconscious bias, and family-work balance. I also see a lot of opportunities by organizing 'Women in Science Symposia' at national and international conferences to increase the visibility of women and young researchers, and in bringing women together on specific occasions to share experiences and receive feedback and advice. In 2019, I was, together with my colleagues Prof. Alke Fink and Dr. Sofía Martín Caba, a recipient of the Agents of Change Award, organized by Elsevier's journal *Materials Today*. This award allowed us to organize different activities around the topic of professional self-confidence, such as workshops, round tables, and networking events.

What impact working on gender equality had on your personal development? I learned a lot myself! I heard about power games, self-confidence, or unconscious bias, and that helps me to assert myself in difficult situations. I also attended special coaching courses to further my education and will continue to do so in the future. I have become very sensitive when it comes to supporting and motivating women to pursue their own goals, not only at work but also in their private lives.



Dr. Maria-Inés Velazco, Senior Consultant – MIV Senses

"I have an optimistic passion for life, education, human relationships, science, arts and sports. I believe that humans can build a peaceful world, preserving natural resources for future generations by working together while nurturing humanity, tolerance and comprehension. Through my different leadership positions in Europe,

North America and Asia, I learnt that multi-cultural and multi-expertise teams achieve better and faster results for the benefit and progress of the society. The recipe is simple: working together and hard with honesty and humility. It's just a question of applying it with common sense. Now retired from executive functions, I contribute to the society by coaching young generations of students in science and bringing my experience to improve education and continuous learning through the complete life cycle".

Among the SDGs, ensuring clean water and sanitation for everybody is as well considered. It is important to point out that in 2022 around 2.2 billion people had no access to safe drinking water and 3.5 billion people lacked safe sanitation.^[26] Improving this situation is not only an importance for nutrition, but also for providing better education and a safer environment where to live. And this has a strong impact on decreasing the gender gap between males and females. If females have access to toilets close by, there will be less chance to be molested and higher probability of attending school and duly pursue their education. While working at Firmenich SA Maria-Inés Velazco collaborated with the Bill & Melinda Gates Foundation in an ambitious and multidisciplinary project aiming at solving this issue in sub-Saharan Africa and India. Their strategy? Develop odor receptor-based malodor counteracting fragrances which in collaboration with other companies and governments could contribute to develop new toilet and waste management technologies.

What were the challenges when working to achieve this goal? On one side, there were technical, legal, economical and cultural challenges to understand problems and design affordable solutions for populations in Africa and India. On the other side, the talented scientists from different disciplines, based in North America, Asia and Europe had to perform as a harmonized team to optimize outcomes in a limited period of time.

How have you and Firmenich contributed towards this goal? We brought our expertise in the fields of odor receptor biology, synthetic and analytical organic chemistry, materials science, sensory and data analysis and perfume creation to design innovative and affordable technologies which could be deployed in the targeted countries.

What impact has this project had on your personal development? This project generated a great motivational energy in a multidisciplinary team of scientists from 3 continents, who worked hard to bring affordable solutions to people in the need. We, as a team, were convinced that clean water and proper sanitation has an enormous impact on the dignity of people and on their ambition and capacity to build a better future for the coming generations.

3. Perspectives

Since 2015 Switzerland has been working hard to implement the 17 SDGs within its borders and as part of the international cooperation and has started to see the fruits of the actions taken so far. We are hopeful that these efforts will continue in the future until sustainable development for all is reached.

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“The content of this publication has not been approved by the United Nations and does not reflect the views of the United Nations or its officials or Member States”.

Author Contributions

CP prepared the main body of the article. GFG and MDSS conducted the interviews and provided the summaries. All authors revised and reviewed the final manuscript. The authors declare no conflict of interest.

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