

EXTRACT

SWISS CLEANTECH REPORT

4th edition

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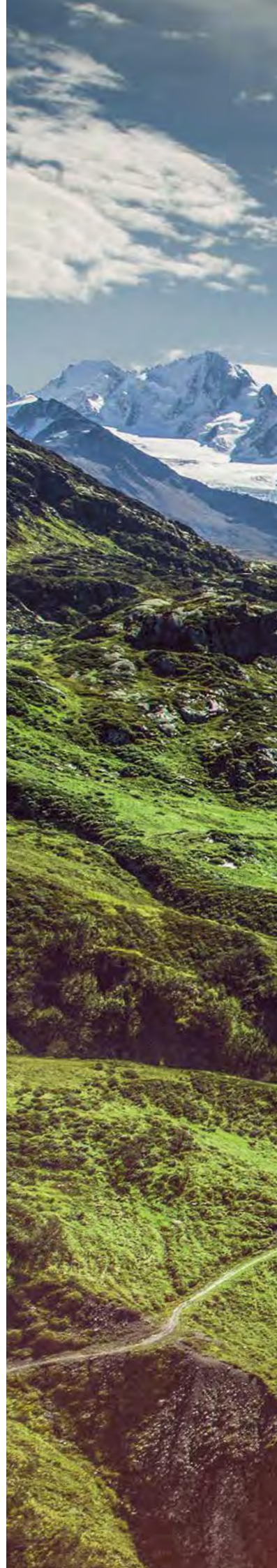
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LEAD THE WAY TOWARDS
SUSTAINABLE AND
INCLUSIVE PROSPERITY

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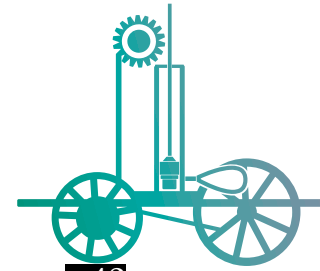
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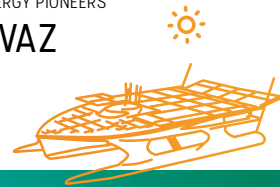
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SWISS INNOVATION
CREATING A MORE
RESILIENT ECONOMY

**Swiss
business
can lead the
way towards
sustainable
and inclusive
prosperity**





Today, it would be simply unprofessional for a business manager not to consider the risks associated with our planet's limitations. This is because our existing value-creation model will not work in the long term, either environmentally or socially. It is therefore high time that we created the framework conditions that will enable us to progress towards sustainable and inclusive prosperity.

There are now more than eight billion human beings on planet Earth – and our natural resources are running out. We must therefore learn to do more with less. One of the ways of achieving this is to develop initiatives that encourage businesses to stop focusing solely on increasing their financial worth and dividends and start thinking also about their impact on our social, human and environmental capital. Another is to invest in clean technologies and make use of every single innovation that enables us to limit the impact of human activities on the environment.

Swiss business has a key role to play in opening up this new approach. Our country has successfully created prosperity despite having very few natural resources and this has always given our industries a clear direction, forcing us to focus on innovation. Furthermore, Switzerland enjoys a culture of excellence in technology. Our education and training system, which boasts a host of learning pathways including universities of applied sciences and federal institutes of technology, is unique. What's more, these specialist science and technology universities, which rank highly internationally, are a hotbed of talent, particularly in the field of cleantech, providing the next generation of knowledge and skills needed to bolster the know-how already permeating the country's economic fabric.

We must invest all these assets in creating sustainable and inclusive prosperity. We now have no choice but to act to change our model, switching from an extractive polluting economy to a regenerative economy.

André Hoffmann

Vice-Chairman, Roche Holding AG
Co-founder of InTent

Introduction to the context and the subject of cleantech



In other countries, Switzerland's image is one of Alpine landscapes, crystal-clear lakes, chocolate and luxury watches. Many people are aware that Switzerland is also at the cutting edge of innovation in a number of fields.

This innovation is happening in watchmaking and pharma/biotech of course, but fewer realise that it also applies to the country's green technologies, or cleantech as we like to call it.

The purpose of this report is to present Switzerland's dynamic and innovative approach to green technologies and sustainability, and in particular to showcase the efforts that the country is making in combating climate change and reducing CO2 emissions to work towards a carbon-neutral society.

With its stable political, economic, social and financial framework conditions, Switzerland is a hotbed of innovation, a fertile breeding ground that encourages the emergence of innovative technologies and practical solutions. In this report, we present these solutions, all of which are helping to bring about a more sustainable future for current and future generations and which are already helping us meet the Sustainable Development Goals championed by the United Nations.

This fourth edition of the Swiss Cleantech Report provides a snapshot of Switzerland's global innovation credentials, demonstrating that the country is a cleantech nation in its own right. Of course, we could do better. It is important to remain humble and bear in mind that the optimum is very rarely the sum of several maximums. Rather, the optimum, or creating a balance, is about weighing up the possible solutions. Because of its federalist culture, Switzerland is expert in doing this, and with its strong values, the Swiss nation can certainly be a source of inspiration to other regions and countries.

What is cleantech ?

DEFINITION AND CLASSIFICATION

Cleantech refers to the technologies, techniques and services that enable us to exploit natural resources in more efficient ways. It involves an extremely diverse range of products, services and processes developed not just to provide superior performance at lower cost but also to reduce – or even eliminate – their negative impact on the environment.

And all this must of course be achieved while consuming our planet’s natural resources in a more responsible way. It is important to realise that cleantech is about much more than simply using technology. It also encompasses all those activities and services that raise awareness of environmental and energy issues and bring about direct action to safeguard the environment and preserve natural resources. Societal and behavioural aspects are therefore playing an increasingly important role, supported by digital technology, mobile apps, IoT and AI that facilitate access to and the processing and distribution of specific data.



ARTIFICIAL INTELLIGENCE



HYDROGEN



HYBRID TECHNOLOGIES



PREVENTION OF NATURAL DISASTERS



ENERGY EFFICIENCY



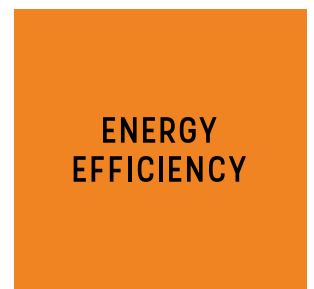
MISCELLANEOUS



SUSTAINABLE CONSTRUCTION /PROPTECH



OTHER



ENERGY EFFICIENCY



PHOTOVOLTAICS



HYDROPOWER



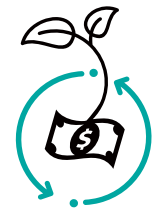
SMARTGRIDS



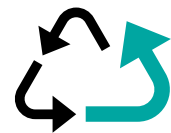
ENERGY STORAGE



OTHER RENEWABLE ENERGIES



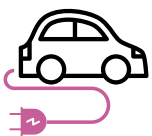
CIRCULAR ECONOMY



WASTE, RESOURCE
EFFICIENCY,
RECYCLING



ADVANCED
MATERIALS



ECO-MOBILITY



INDUSTRIAL ECOLOGY
/CONSULTANCY



AGRONOMY AND
COMMERCIAL
FORESTRY



ENVIRONMENTAL
TECHNOLOGIES

TRANSPORTATION



FINANCE



SUSTAINABLE
FOOD
PRODUCTION



WATER

RENEWABLE
ENERGY
PRODUCTION AND
DISTRIBUTION

SERVICES

AGRITECH

RESOURCES





The Sustainable Development Goals

A REALITY IN SWITZERLAND

The Sustainable Development Goals (SDGs) refer to a set of 17 objectives established by the member states of the United Nations. These SDGs constitute the reference framework for sustainable development on a global scale. They follow on from the Millennium Goals established in the previous period. These goals come under the 2030 Agenda, an action plan adopted by the UN in September 2015 following two years of negotiations involving governments and civil society.

The 2030 Agenda defines the targets set by the SDGs that must be reached by 2030.

The SDGs and their 169 targets (sub-goals) form the cornerstone of the 2030 Agenda. They apply to everyone (governments, civil society, businesses, science and every individual citizen) and take into account in equal measure

the economic, social and environmental dimensions of sustainable development.

Switzerland and Swiss business are of course formally committed to meeting these goals. And this is where cleantech comes in. It can help meet some of these goals more quickly, more effectively and more cheaply.



Throughout this publication, you will find references to these 17 goals, highlighted by a separate icon for each one.

 **SUSTAINABLE DEVELOPMENT GOALS**

1 NO POVERTY



2 ZERO HUNGER



3 GOOD HEALTH AND WELL-BEING



4 QUALITY EDUCATION



5 GENDER EQUALITY



6 CLEAN WATER AND SANITATION



7 AFFORDABLE AND CLEAN ENERGY



8 DECENT WORK AND ECONOMIC GROWTH



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



10 REDUCED INEQUALITIES



11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



13 CLIMATE ACTION



14 LIFE BELOW WATER



15 LIFE ON LAND



16 PEACE, JUSTICE AND STRONG INSTITUTIONS



17 PARTNERSHIPS FOR THE GOALS



Switzerland's cleantech credentials in figures



In Switzerland, **97%** of sewage is treated at wastewater treatment plants. ¹

2021

At the end of 2020, Switzerland was recycling **99%** of its glass, **82%** of its PET, **97%** of its aluminium and **82%** of its paper. ³

Nearly **two-thirds** (61.5%) of the electricity consumed in Switzerland in 2021 was produced by hydroelectric plants. ⁴

In 2021, Switzerland emitted **45.2 million tonnes** of CO₂ equivalents (tCO₂e) – **1.3 million tonnes** more than in 2020. Overall, emissions were **18.2%** below the 1990 level. ⁵

^{1,2,3 & 5} Federal Office for the Environment, ^{4 & 6} Federal Office of Energy, ⁷ Swissolar, ⁸ Federal Statistical Office, ⁹ Suisse Energie

2022



With a carbon footprint of **12tCO₂e** per inhabitant in 2020, Switzerland is still well above the global limit, which is 0.6tCO₂e per inhabitant per year. ²

In 2021, **53%** of property owners in Switzerland already had a heat pump or said they might consider installing one. ⁶

In the first half of 2022, **one in four** newly registered cars in Switzerland was fully or partially electric. ⁸

Approximately **9100** electric vehicle charging points were available in Switzerland at the end of 2022. ⁹

By the end of 2021, nearly **150,000** solar installations with a total power output of 3.65 gigawatts had been installed in Switzerland. They covered 6% of the country's electricity needs. ⁷

“ If we want to reduce our carbon emissions, we must firstly acknowledge the CO₂ impact our actions are having and promote the use of every clean technology that helps us to reduce our energy consumption.

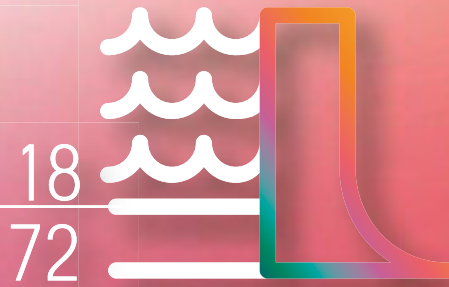
With its experience in electricity, Switzerland is very well positioned to develop products and solutions that are tried and tested when it comes to reducing our carbon footprint. The Swiss Confederation must do everything it can to foster this development and prevent Swiss businesses from moving abroad. The cleantech boom is an extraordinary opportunity to create jobs and innovations.

André Borschberg

Co-Founder of H55 and Solar Impulse Pilot

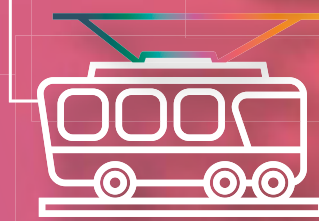


Significant dates that have marked Switzerland's enduring love story with cleantech



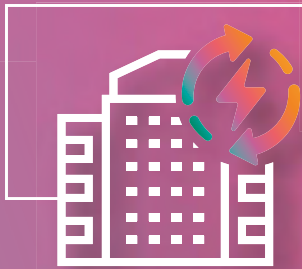
18
72

Construction of the Maigrauge Dam is completed. This is the first concrete dam in Europe, built to supply the city of Fribourg with drinking water and power the region's industry.



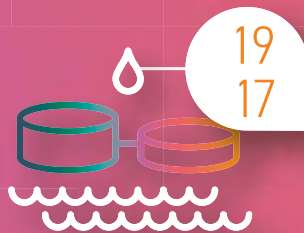
18
88

Switzerland begins to electrify its rail network on a massive scale, ahead of other countries. Electrification begins with the country's tram routes and branch railway lines. The first section to be electrified in Switzerland is the Vevey-Montreux-Chillon tram line, in 1888.



18
91

Founding of the Swiss company Brown, Boveri & Cie (BBC) in Baden, later to become ABB, a key player in electrification and energy technologies.



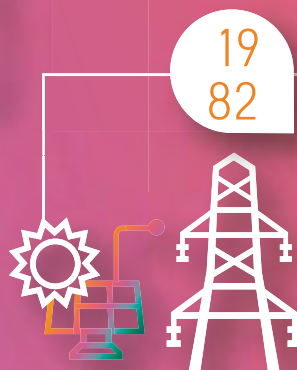
19
17

Construction of Switzerland's first waste water treatment plant, in St.Gallen.

19
61



Opening of KEZO, the first waste processing and recycling plant, near Zurich.

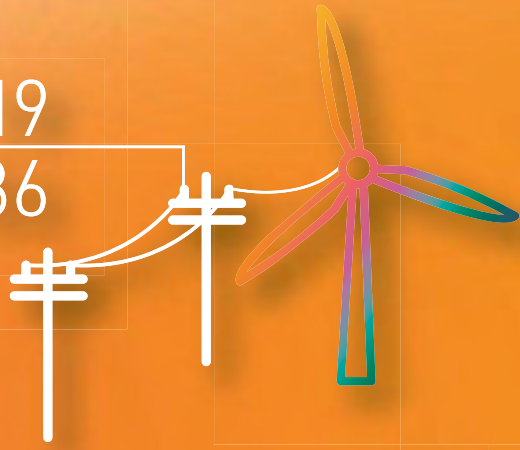


19
82

Switzerland becomes the first country in Europe to connect a PV solar power system to the electricity grid. This installation is still in operation today.

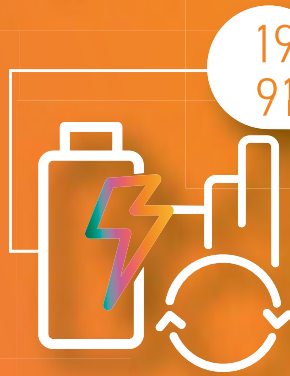
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86

Switzerland's first wind farm to be connected to the electricity grid becomes operational. The country's first wind turbine is still going strong 30 years on, although it does require major maintenance.



19
91

BATREC builds a battery recycling plant at Wimmis. Switzerland has one of the highest battery return rates in Europe.



19
92

Opening of the first biogas processing plant in Switzerland, at Gossau, which uses organic waste to produce biogas and electricity.



19
93

The first soil washing plant is opened in Zurich by Eberhard. This facility helps protect the environment by washing rubble and soil contaminated with harmful substances.



19
97

Opening of the first commercial wind farm in Switzerland, at Mont-Crosin.



20
11

The Federal Council announces its intention to phase out the use of nuclear power.



20
17

A fourth treatment stage is introduced at waste water treatment plants. Powdered activated charcoal or ozone is used to remove micropollutants.



” **The broad field of cleantech entails significant challenges and opportunities for Swiss training and education. The fact that so many stakeholders are involved reinforces our country’s ability to innovate.**

Martina Hirayama
State Secretary
Federal Department
of Economic Affairs,
Education and Research
(EAER)
State Secretariat for
Education, Research
and Innovation (SERI)



Switzerland and the Sustainable Development Goals



Since 2016, Switzerland has aligned its sustainable development strategy with the UN's 2030 Agenda, the global reference framework for all sustainable development policies. In June 2021, the Federal Council adopted its new 2030 Sustainable Development Strategy, reaffirming its willingness to contribute, alongside every other nation on the planet, to meeting the Sustainable Development Goals (SDGs) both nationally and internationally by 2030.

In many respects, Switzerland enjoys a privileged situation when it comes to sustainable development. However, like other countries, it still has work to do in various fields if it is to complete implementation of its 2030 Agenda in time. The federal government is henceforth focusing on three priority areas: sustainable consumption and production; climate, energy and biodiversity; and equality of opportunity and social cohesion. Its strategy also determines how civil society, the economy, the financial market, alongside education and training, research, and innovation, can help further sustainable development and identifies the framework conditions required for success. Lastly, this strategy defines the contribution to be made by the federal government through its benchmark-setting role.

Compared to other countries, Switzerland was able to begin working towards the 2030 Agenda goals from a comfortable starting point. In areas such as education, healthcare, infrastructures and competitiveness, it was in a good place from which to move forwards. Nevertheless, in terms of both domestic and foreign policy, Switzerland has some way to go if it is to meet all of its objectives by 2030. More action and coordination are required, particularly in the three priority areas listed above.

To meet these goals, Switzerland is going to have to make determined policy decisions in all sectors and secure the commitment of all of Swiss society. In the coming years, the SDGs will have to be integrated more closely into the different policy areas, strategies and budgets, without losing sight of the systemic approach.

In addition to the federal government, the economy has a part to play in achieving these objectives. It will do this through innovation, in particular in the environmental technologies sector where, each in their own way, many Swiss companies are helping to reach these goals. Specific examples of how they are doing this are provided after the introductory section of this report.

58 practical solutions and innovations

TOUR OF SWITZERLAND

On the following pages, we present more than fifty practical projects that demonstrate the innovative spirit of Switzerland's cleantech companies. They show that behind the framework conditions and regulations, there is a long line-up of businesses working hard on a daily basis to come up with innovative solutions that are helping to combat climate change and work towards a zero-carbon society.

Of course, this selection is not exhaustive, but it provides a useful snapshot of Switzerland's capacity for innovation. For every solution put forward, we also reference the Sustainable Development Goals that it is helping to meet (see page 11). In most cases, these innovations are already up and running in many countries, where they are helping to resolve some of the issues faced locally. In this way, Switzerland is passing on its expertise and know-how in different areas of cleantech innovation.

Each of the following pages also contains a QR code that will take you to more detailed information about the innovation concerned.

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**Swiss
innovation
creating
a more
resilient
economy**





In Switzerland, as elsewhere, our resources are running out, leaving us with a complex new reality. In the face of shortages of raw materials, geopolitical tensions and the impacts of pandemics, rethinking our modes of production and consumption is now a *sine qua non*, not just for business but for society as a whole.

In this time of change, the circular economy is emerging as an essential paradigm shift. It is no longer a question of simply recycling materials but of completely rethinking our actions throughout the product life cycle, for example by reinventing product design from scratch.

Switzerland the pioneer, with its economic fabric teeming with solutions, is at the forefront of this approach. The circular economy provides us with a framework and is becoming a sort of compass that offers stability and opens up the way to a more resilient and more balanced future. In this landscape, the initiatives of CleantechAlps and its partners, the authors of this Swiss Cleantech Report, stand out like a beacon, striving to accelerate the transition to a more sustainable society targeting net-zero emissions by 2050.

The potential of the solutions coming out of Switzerland and other countries is vast. Our challenge now lies in deploying them on a vast scale and, in particular, making far-reaching changes to the legal framework to allow this to happen. Economically viable game-changing solutions are waiting in the wings. This is a major challenge, but one that Switzerland is determined to meet through our policy of collaboration open to everyone involved.

Sustainability is no longer simply an objective; it is a necessity. Switzerland, with its commitment to clean technology, is forging a path to a greener future.

Join us in this collective quest for a more sustainable society in which the circular economy will guide us towards resilience, balance and a regenerative economy.

Eric Plan

Secretary General
of CleantechAlps

IMPRESSUM

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