# Innovations to tackle the grand challenges in climate change – a climate-tech startup landscape

Due to continuously rising greenhouse gas (GHG) emissions, our planet is experiencing extreme weather events at a rate never seen before. To keep the temperature rise below 2°C (ideally 1.5°C), we need strong climate policies, but also groundbreaking innovations to reduce, store, neutralize, and avoid emissions altogether.

In the past years, startup activity in the area of so-called climate technologies has been rapidly increasing, especially focusing on innovative solutions in those sectors which traditionally are contributing most to global warming. In this article, we present a glimpse of a landscape of promising European startups with focus on the DACH (Germany, Austria, Switzerland) region, which are changing the status quo of the five most polluting industry sectors: energy, food, agriculture & forestry, manufacturing, transportation, and buildings. Moreover, we are also presenting startups which are developing applications for behavioral change and analytics to drive the reduction of carbon emissions.
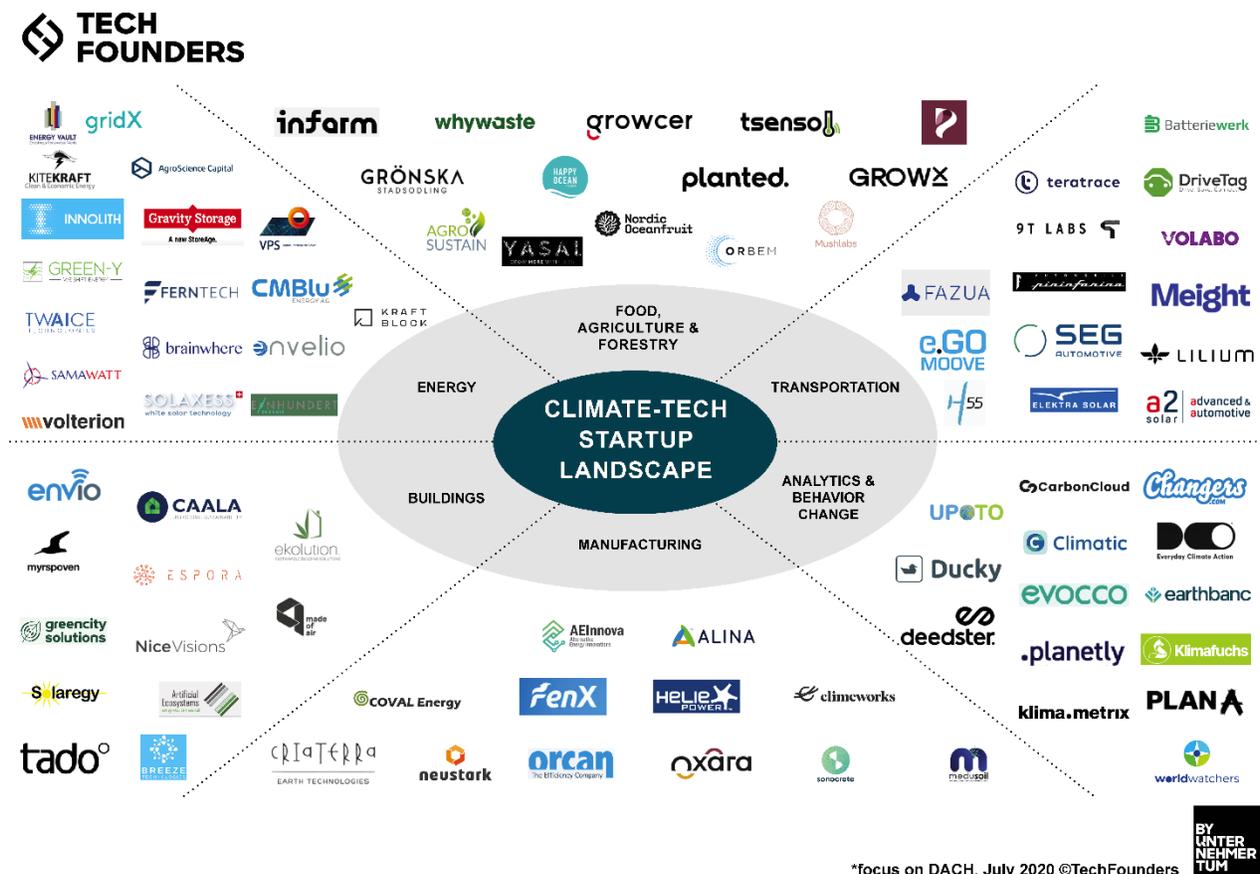
*focus on DACH, July 2020 ©TechFounders

Climate-Tech Startup Landscape

ENERGY

The energy sector is the biggest contributor of global greenhouse gas emissions, accounting for 25% according to the Intergovernmental Panel on Climate Change (IPCC). Not only for this reason it is worth innovating in renewable energies, but also because it is part of a bigger solution: with clean energy available, we unlock the opportunity to power other sectors and therefore also reduce and avoid their emissions. A variety of startups are looking to find more aesthetic, economic and efficient solutions to generate energy such as the startup **Solaxess**, providing solar panels without visible cells.

Nevertheless, the biggest challenges remain in energy storage and grid supply infrastructure development. However, there are many startups working in this field, which eventually will allow us to have clean energy even on cloudy and windless days. For example, the German startup **Kraftblock** provides thermal energy storage, which not only has a high storage capacity (1.2MWh/m^3), but also converts industrial heat waste into energy.

TECH FOUNDERS

FOOD, AGRICULTURE & FORESTRY

When it comes to the agricultural sector, the main challenge is to find a way to feed our exponentially growing population without increasing emissions at the same level. For this reason, the areas of innovation are concentrating around making our food system less wasteful as well as finding less polluting and more sustainable ways of nutrition.

A good example to reduce food waste is the Swedish startup **Whywaste,** which provides a management and analytics software system that keeps track of expiration dates in grocery stores, reducing up to 40% of spoiled food in the food retail logistics chain.

Furthermore, there are numerous startups which are bringing new nutrition alternatives to meat or dairy products, thereby contributing to the reduction of methane emissions (as livestock is accountable for 4% of methane emissions). One example is the startup **Mushlabs**, founded in 2018, which is offering meat alternatives based on mushroom roots (mycelium).

Reducing the farming land is the other big challenge that needs to be addressed to make agriculture more efficient and sustainable. Numerous startups are trying to change the paradigm of traditional farming practices by innovating in vertical farming technologies, such as the startups **Growcer** from Switzerland and the Sweden-based **Grönska**.

MANUFACTURING

Industrial production processes emit a large amount of emissions. For this reason, the development of sustainable manufacturing practices for raw materials (such as steel, concrete, cement, paper, etc.), components, and products is going to significantly change this sector within the next few years.

For example, many startups are innovating in low-carbon construction technologies based on the principle of circular economy, such as the Swiss startup **Neustarck** with its up-cycled concrete aggregate from demolished concrete, which turns CO_2 into calcite. The Zurich-based startup **Oxara** also produces environmentally friendly concrete. With their non-hazardous additives, Oxara transforms excavation material waste into concrete, achieving a 90% CO_2 reduction compared to conventional concrete. Nevertheless, the production of other conventional materials such as steel is still a long way from becoming part of the solution in sustainable manufacturing.

On the other hand, eliminating CO_2 particles from the atmosphere is equally important, since they remain in the atmosphere heating up the planet for years. To address this challenge, we have found some startups which are showing future potential. For example, a lot of research is happening around carbon capture technologies, a field where the Swiss startup **Climeworks**, with a total funding of $125 million, is taking the lead. With their renewable powered and stackable machines, the carbon captured can either be recycled or reused as a raw material, and they guarantee that 90% of the captured CO_2 is permanently removed.

TECH FOUNDERS

TRANSPORTATION

The transportation sector generates the 4th largest share of greenhouse gas emissions (14% according to the IPCC), primarily from road transportation and burning fossil fuels for planes, trains, trucks/cars, and ships for passenger travel (60%) and freight (40%). It is responsible for the fastest growth in CO_2 emissions and is expected to continuously grow. While all established and numerous new mobility companies are working intensely on increasing fuel efficiencies, developing new materials and alternative drive technologies as well as new mobility concepts, there are also several new companies disrupting the industry with radically new approaches and technologies. For example, the Munich-based startup **Lilium** envisions making air mobility service a reality with their fully-electric 4-passenger jet, and the German startup **e.GO MOOVE** is bound to completely redesign urban mobility with their electric, connected and autonomous commercial vehicles.

And, of course, there is a broad landscape of startups developing more efficient and lighter electric power trains such as **Fazua** (electric bikes) and **Volabo** (electric motors for boats).

BUILDINGS

Due to rapid population growth, the demand for building sites is expected to further increase in the next few years. Buildings are a big source of GHG emissions due to the materials used for their construction and the energy supply for lightning and heating.

Startups are bringing alternative products to reduce and mitigate the impact of any building by offering carbon-negative materials for facades or insulation. For example, the 2016-founded startup **Made of Air** has developed a material which is 90% made of atmospheric carbon. It has several applications in the building sector, such as facades or interiors. Another example is the startup **Artificial Ecosystems**, which provides green panelings for buildings to absorb CO_2.

Equally important is to find a way to make buildings' resources more efficient and reduce unnecessary emissions. Startups such as **Envio** and **Myrsproven** optimize building's energy usage, while startups such as **Tado** offer smart heating.
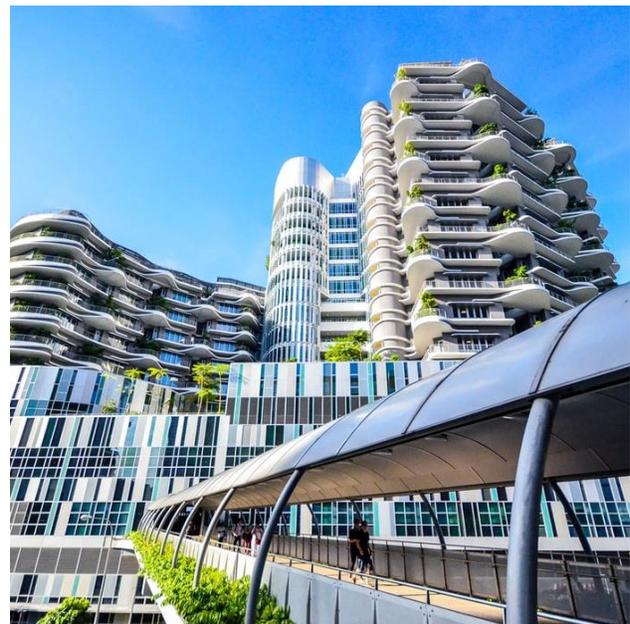
ANALYTICS & BEHAVIOR CHANGE

Achieving a more sustainable and carbon-free planet is a responsibility that all citizens and organizations need to take. To help us be more conscious about our carbon footprint in areas such as transportation or food, many startups have developed analytical software or mobile applications to analyze carbon footprints and incentivize individual users to reduce emissions through different consumption or mobility patterns, and show companies how they can reduce or offset emissions.

For example, the Berlin-based startup **Changers** offers a mobile application which encourages citizens, employees, and other users to act environmentally conscious through collecting tokens which can be exchanged for prizes. Many other startups such as **Plan A** or **Klima Metrix** are helping companies to calculate and offset their carbon footprint.

CONCLUSION

The ambitious goal of the EU to comply with the Paris Agreement by 2030 implies a huge cut down of 40% of greenhouse gas emissions. To do so, we must ramp up our support for startups with technologies to combat climate change.

We strongly believe startup activities around climate-tech will see tremendous growth in the next few years, since all stakeholders including government, capital markets, and corporates are becoming even more conscious that innovation is key to the sustainable transformation we need.

Authors
Miki Yokoyama
Florian Ebel
Marta Tarruella
Brian Diaz

TECH FOUNDERS