

Sustainable Stories

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AFRY's vision is Making Future. In Sustainable Stories you can read about some of AFRY's recent assignments and how we, together with our clients and partners, accelerate the transition towards a sustainable society.



AFRY
ÄF PÖYRY

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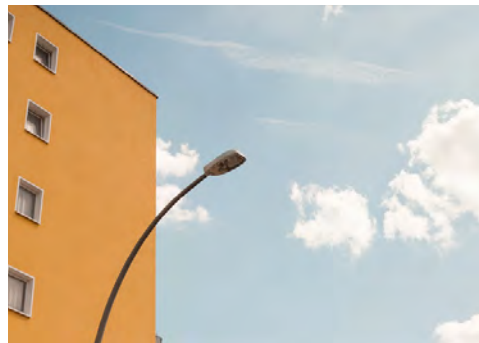
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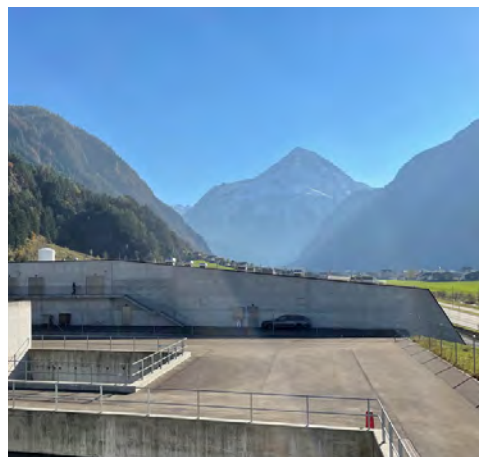


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THE GLOBAL GOALS



To our readers

With less than a decade until 2030, global action to achieve the UN Sustainable Development Goals (SDGs) is lagging behind. Even before the Covid-19 pandemic there were indications of uneven achievements of the goals and progress far behind what is necessary. While there has been visible progress in the years since the 2030 Agenda was adopted in 2015, with targets reaching greater access to education, health-care, and clean water as well as increased empowerment for women, the pandemic has once again increased economic and social inequalities. The UN and the world leaders have therefore called for a [“Decade of Action”](#) to further accelerate the transition and solutions for sustainable development – encompassing environmental, social, and economic aspects – on a global scale.


While global partnerships, commitments and policies are effective, these initiatives must be coupled with actions on a local and individual level to accelerate the sustainability transition. As a global engineering and design company, AFRY has the opportunity as well as responsibility to influence technological, social, and environmental development in line with the SDGs.



At AFRY, we aim to ensure a holistic perspective in our assignments that minimises the negative impact (the footprint) and maximises positive values (the handprint). Our holistic perspective comes from an awareness that it is through our assignments that we have our biggest impact. Working towards the SDGs is a complex process, where the achievement of one goal might counteract development of another. Simultaneously, many activities have synergetic potential where one targeted goal creates positive spill over effects for another. Achieving sustainable development is a process of tough priorities. At the same time, all efforts are important in making the necessary changes in practices and mindsets.

All the selected Sustainable Stories assignments contribute to the SDGs in several ways. Our objective is to secure net positive impact in all our assignments. By integrating the SDGs as a critical lens in our assignments we continuously reflect on priorities to ensure the maximum positive impact of our solutions. The cases that AFRY have chosen to highlight in this publication are our most innovative work in different sectors which are at the forefront to accelerate the sustainable transition. We have chosen to highlight the main SDGs that our assignments and solutions contribute to, to encourage and inspire others in their efforts to create more sustainable solutions in different sectors.

More information on how AFRY works towards the SDGs can be found at [AFRY.com](https://www.afry.com). Read more about the UN Sustainable Development Goals and how they are interconnected at globalgoals.org. ●



AFRY's Youth Panel - Raising the voice of tomorrow's leaders

AFRY YOUTH PANEL

The global challenges we are facing today, such as climate change and biodiversity loss, will have a huge impact on future generations. For young people, sustainability is top of mind. We intend to do what we can to safeguard our future – a time when most of the sustainability goals set today are planned to be achieved. Therefore we, the young workforce at AFRY, have come together to establish a youth-led initiative, the Youth Panel. Our aim is to raise the voice of AFRY's young workforce on issues related to sustainability, and make sure to influence the decisions affecting our future. —————>

The world is today home to 1.8 billion young citizens - the largest generation of young people in history¹. A generation that demonstrates rising concern about climate change, yet they are often left out of the discussion. With the emergence of youth-led environmental movements such as Fridays for Future, it is clear that young people want to be part of the solution. During the United Nations Climate Change Conference COP26, these movements highlighted the importance of young people's participation in sustainable development. Similarly, we believe that in the corporate world, young employees have an important and unique role when driving sustainability initiatives forward. The young workforce is part of the first generation to have sustainability as part of the school curriculum and they are dedicated to apply this knowledge.

The objective of the AFRY Youth Panel is to challenge the organisation. We convey the messages of the young workforce to give direct and concrete input to setting the sustainability agenda, making sure that the young perspective is embedded in our targets, strategies, and client assignments. We continuously track the development and decisions being made, ensuring that insights and questions turn into actions and answers, and making sure we accelerate the transition towards a sustainable society.



1. United Nations. (2022). Youth in Action. <https://www.un.org/en/climatechange/youth-in-action>

The AFRY Youth Panel project group

Annie Croona, Emilio Ambrogi, Joana Barragan, Karin Andersson, Linda Strindevall, Mario Rudner & Thomas Steinberger

The Youth Panel is pleased to see that our clients are seeking help to obtain sustainable solutions and we are confident that AFRY has the collective knowledge and experience needed to deliver this. In this publication, we see some great examples of projects moving society in the right direction.

Our initiative is still – or constantly – under development. The small, initial project group will expand to something bigger. We aim for this to be a dynamic, youth-led movement with members from all parts of the organisation and from different parts of the world. After all, sustainability is not something to manage in isolation, but in collaboration. We are convinced that our young workforce is eager to challenge the old ways and use their technical expertise to drive sustainable progress. Now, we hope to offer them a platform where they can come together in what this is all about: Making Future. For real. ●

A sustainability transition is possible – together we can

JONAS GUSTAVSSON, PRESIDENT AND CEO

At AFRY we see good opportunities in society to accelerate the sustainability transition. There is a need to address the global challenges meaning that business as usual is no longer an option. To make everything from carbon capture, use of electricity and food production more sustainable, resilient, and effective, we can impact society in a positive direction. It is at the forefront where AFRY together with our clients works relentlessly to create sustainable engineering and design solutions to make change happen.



We can all feel distress about the state of our planet. About the deforestation, collapsing marine ecosystems, biodiversity loss and mounting instead of decreasing global carbon emissions. Not to mention reports on weak progress of social development, poverty, and inequality. We believe it is a fundamental responsibility for all business leaders to take part in different stakeholder dialogues, be informed and concerned. But even more crucial is of course to take action and to do everything in our power to act for a sustainable development on a global scale. We should be optimistic and firm believers of all the possibilities laying in front of us and use engineering, digitalisation, and technology as a force for the good.

No more of the same

AFRY has a proud history of making the future possible. Since decades, AFRY's experts have been working alongside our clients in driving change and transforming industrial processes globally. To increase productivity and efficiency and to position new technologies and competencies into operations has always been important. But today, the need to accelerate the transition to a sustainable society is key.

In this year's edition of Sustainable Stories we proudly present different cases - ranging from social housing to carbon capture - from a number of markets where we in close partnership with our clients and partners have accelerated the sustainability transition.

In the selected cases the common denominator is that we together have succeeded with positive change. Not only fine tuning what already exists, but together challenging conventional wisdom and ways of working. In several cases we have achieved not only a technology shift but, more importantly, a shift in the overall strategic agenda and business model. —————>



**Technology, business and social innovation – all combined**

What makes the cases interesting is where we can show that we have moved from pure technological innovation to business and social innovation. That is transforming not only the way we produce goods and services, but also the way we sell, consume, reuse and recycle them. To bring a lifecycle perspective to every product and every service design. How can we design not only a low-emission car, but a low-emission end-to-end mobility service? This is where the total ecosystem of different actors comes together. Also, where different actors need to integrate both upstream and downstream to together create new business models and find new ways to organise a sustainable society. For most companies today, sustainability has become not only a driver for competition but a necessity – a license to operate and a driver for profit and growth.

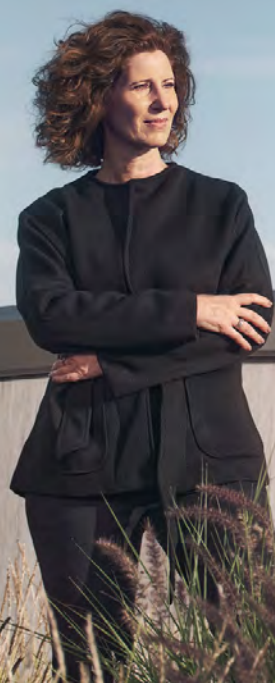
Transformers, disrupters, and enablers – a needed ecosystem

At the root, the threshold for change is ultimately about the ability to add and implement new competencies and skills to the present business. Naturally, the prerequisites in companies with heavy assets built up during decades is very different from the conditions of a start-up disruptor with no assets. However, irrespective of how old or how large the company is, we see knowledge as the key enabler for change. And we see transformation as the key core competence of AFRY where we as an enabler can support our clients with the holistic view needed to continue the acceleration for change. ●

Jonas Gustavsson, President and CEO

AFRY accelerates the sustainable transition

The Exponential Roadmap Initiative provides a network where innovators, transformers and disruptors come together to work towards the shared target of limiting climate change to 1.5°C compared to pre-industrial levels. The Exponential Roadmap Initiative emphasises collective responsibility and realising impact. AFRY supports clients in this effort by delivering sustainable solutions.



We need to keep
global warming to
a maximum of:

1.5°C

The UN climate report Global Warming of 1.5°C concludes that we need to keep global warming to a maximum of 1.5°C to avoid the high risk of catastrophic consequences for people and the planet. Global warming has induced a climate emergency where flooding, draught and shortage of food are causing ecosystem decay and forcing people to flee their homes.

In the midst of the climate crisis, we are starting to see evidence of increased global efforts, with decarbonising strategies and new solutions scaling up at a pace never seen before. The share of renewables in the energy sector is increasing, social movements and governments are driving sector-wide transformations, and corporations are seeking new business models in line with a net zero-carbon world.

We are only in the early stages of the all-encompassing transformation needed to limit global warming to 1.5°C. While the task seems daunting, researchers and scientists are optimistic that scalable action is achievable – with the right measures. —————>



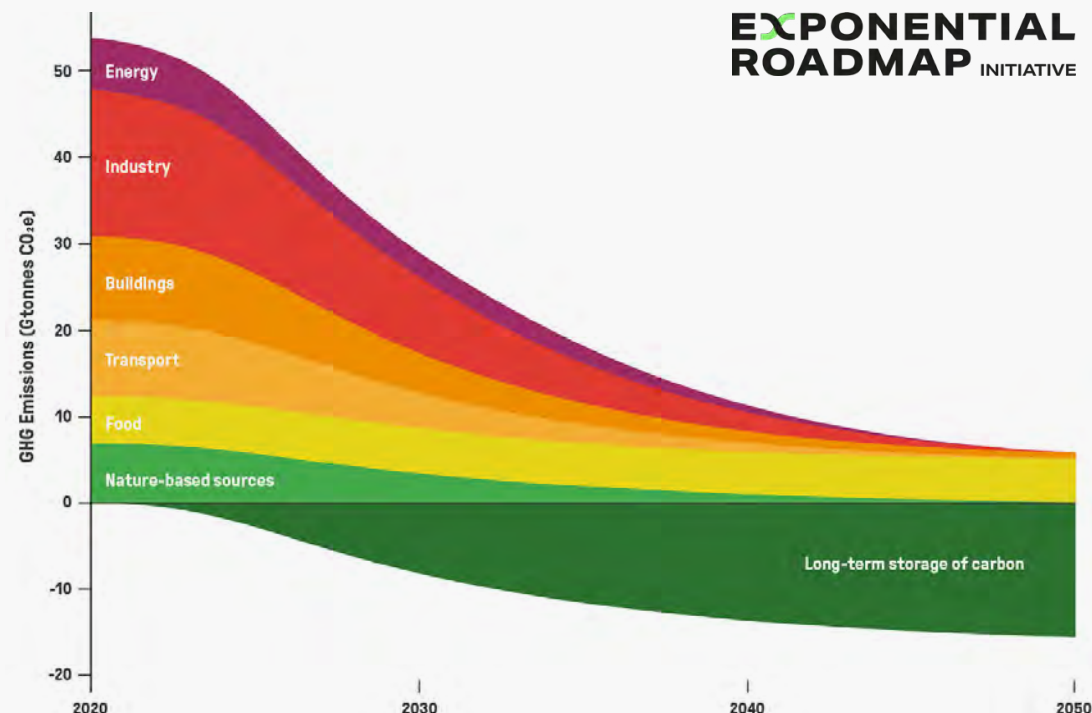
A roadmap towards decarbonisation with scalable action

The idea of a direct and actionable approach to decarbonisation is at the core of The Exponential Roadmap Initiative, a collaboration that fosters partnerships and accelerated action across sectors, disciplines, and country borders in line with the 1.5°C limit. The Exponential Roadmap is a framework for businesses and organisations worldwide that guides strategic decisions and actions towards decarbonisation.

The initiative conveys the latest climate science in a tangible way by stressing the importance of adhering to what is called the Carbon Law, i.e. halving emissions every decade to reach net zero by 2050. AFRY's solutions support our clients in implementing necessary climate action. Following the Carbon Law pathway is not easy, but there are already solutions in place that have the potential to halve emissions across all industry sectors.

The Exponential Roadmap highlights 36 solutions within six transforming sectors that are crucial to mitigate and reduce greenhouse gas emissions, both in the short term and in coming decades: energy, industry, transport, real estate, food consumption and nature-based solutions. The solutions are based on existing technology that is both affordable and scalable and has the potential to increase profitability and grow business. By presenting scalable climate services and market-ready solutions, the goal is to move away from incremental solutions in favour of exponential climate action.

AFRY will apply the partnership with the Exponential Roadmap Initiative in daily operations through the AFRY 1.5°C Roadmap, which is based on the 1.5°C Business Playbook. The roadmap formalises AFRY's climate actions to meet our climate targets.



Exponential emission reduction pathways to limit global warming to 1.5°C

The graph illustrates sectoral emission reduction pathways (through avoiding emissions and sequestering greenhouse gases) for halving global emissions every decade during 2020–2050 (Carbon Law). The pathways on the positive y-axis indicate emissions avoidance whereas on the negative y-axis they indicate ramping up natural sinks for greenhouse gas sequestration. According to this scenario, net-zero greenhouse gas emissions is achieved by 2039, and after that, greenhouse gas sequestration is greater than emissions. Note that the energy sector's emissions address only emissions related to the process of energy production (energy supply) and do not include electricity- and heat-related emissions in buildings, industry and the transport sector, which are instead allocated to those sectors. In the food sector, solutions draw down emissions from 5.6 Gt in 2020 to 5.0 Gt (planetary boundary for food) by 2050.

Source: Exponential Roadmap, version 1.5.
https://exponentialroadmap.org/wp-content/uploads/2020/03/ExponentialRoadmap_1.5_1_216x279_08_AW_Download_Singles_Small.pdf

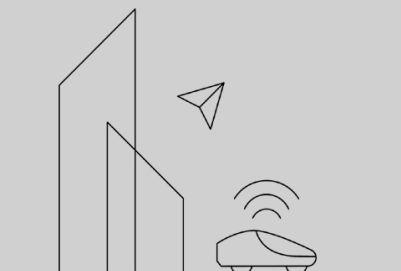
4 transforming segments

36 solutions to halve emissions by 2030

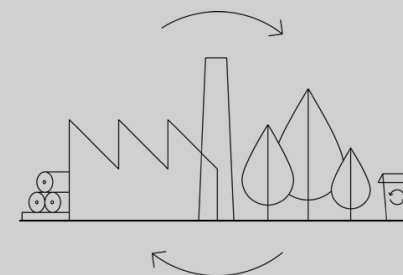
The solutions in the Exponential Roadmap Initiative are part of our offering and assignments. Assignments throughout the entire organisation have the potential to contribute to the 1.5°C ambition.

AFRY's strategy highlights four transforming segments where we have a strong position in client value chains – Infrastructure, Bioindustry, Clean Energy and Food & Life Science. It is here we anticipate strong and longterm growth, and it is here that we expect to see an increase in demand for scalable, cross-functional, and sustainable solutions. By focusing on these segments, we have a larger impact and deliver on AFRY's mission – to accelerate the transition towards a sustainable society. ●

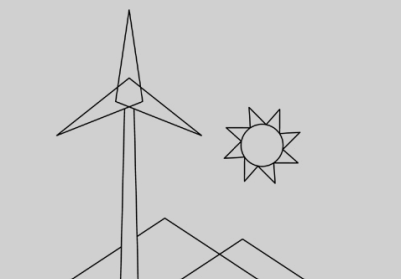
INFRASTRUCTURE



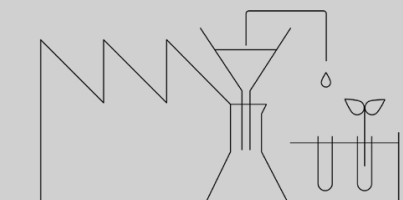
BIOINDUSTRY

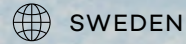


CLEAN ENERGY



FOOD & LIFE SCIENCE






Leveraging digital solutions and AI to reduce the climate impact of residential energy use

Smart and energy efficient systems has a large potential to add value for both construction companies and property owners alike. An exploratory project allowed the real estate company Tornet to investigate innovative ways to link ground-breaking energy solutions to behavioural change among residents to minimise climate impact. With AFRY's service, a multidisciplinary project team came together to deliver concrete ready-to-implement solutions for Tallbohov Electric Village in Sweden. —————>

Our homes account for a large amount of global greenhouse gas emissions. In spite of this knowledge, the tools available to influence how we use energy in our homes risk being too blunt to have much impact. Electrification, greener energy sources, and general energy reduction techniques, are currently not able to adjust for, and take advantage of, momentary energy capacity levels.

Residential real estate company Tornet has operated at the forefront of flexible energy systems for quite some time and is well-aware of the energy supply challenges of the future. As part of a broader ambition to minimise climate impact, Tornet partnered with the governmental agency Boverket, the Swedish National Board of Housing, Building and Planning, and AFRY in order to explore innovative ways to link ground-breaking energy solutions with behavioural change among residents. 



“Maintaining a holistic perspective was a key success factor in the project. It was complex, but the complexity was important because it allowed us to tap into so many different sources of expertise.”

Therese Wernstedt

Senior Sustainability Expert at AFRY

Sustainability Scanning lets us view buildings as ecosystems

The project takes a new, holistic approach to how we see buildings, viewing them as complete ecosystems, where reduced climate impact is achieved through a cross-functional approach at every level – from the underlying energy system to individual residents. Managing a cross-functional process is also what makes the project complex.

In this project, AFRY used one of proprietary systematic processes called Sustainability Scanning. The scan is conducted together with the client at the beginning of a project to identify how sustainability targets such as the Sustainable Development Goals (SDGs) can be met. The purpose is to gain an understanding of the most important sustainability issues for the project and to manage those issues in a systematic manner. →

Using AI and digitalisation to shift from reduced energy consumption to reduced climate impact

A key part of the project was to implement a new type of energy system. Tallbohov Electric Village's energy system is designed to achieve low climate impact through local energy production, and storage of electricity for effect peaks, in combination with encouraging responsible energy consumption among residents. The project uses Artificial Intelligence (AI) to effectively steer the building's energy system towards minimising energy consumption and decreasing climate impact while maintaining an optimal indoor climate, says Hans Forsberg, AI Strategist at AFRY.

"AI can optimise complex systems on a level that we can't achieve in other ways, especially when it comes to minimising climate impact and not just energy consumption. Because the climate impact of energy consumption largely depends on what the variable energy market looks like at the moment," says Therese Wernstedt at AFRY.

To promote more climate-smart energy consumption among residents, AFRY's digital platform leverages AI to give feedback on historic climate footprint while providing a real-time view of ongoing usage and offering predictions for expected consumption. This enables individualised suggestions to residents on how to reduce their climate footprint, such as encouraging them to use the [WWF's](#) climate calculator to consider alternative food choices. —————>



"It's clear that the AI-driven system is doing what we want it to do. Our job then is to create a link between the AI insights from the energy hub and the residents. When we have made that connection, we can influence how they behave when it comes to using energy."

Thomas Norr

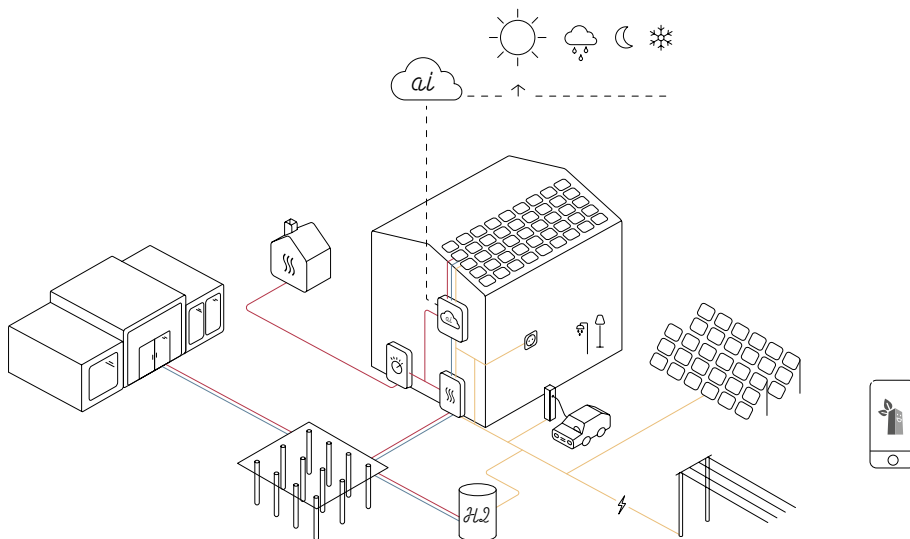
Project manager at Tornet

The digital platform is brought to residents through the user interface TORNA – a smartphone app connected to the building's energy system. In the future, it could also be integrated into, for example, a smart mirror in the apartment.

The TORNA system for residents has been developed to achieve a range of interim targets, says Elin Annebäck, Designer at AFRY. The features are related to climate-smart energy consumption, including giving recommendations related to sustainable travel and sustainable consumption of food, goods, and services.

For Thomas Norr at Tornet, the project has been a journey in embracing a holistic view of Tornet's buildings, digitalisation, and sustainability.

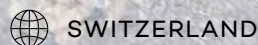
“Over the course of the project, it became increasingly clear to me how important the overall concept is to our ability to reach our goals. I no longer want to talk about energy steering via AI or TORNA separately, it's the combination of these tools that is the key,” says Thomas Norr. ●



Project overview: Tallbohov Electric Village

The Tallbohov Electric Village project cast a wide net and focused on investigating three main areas:

1. Cutting-edge technology for the energy systems of the future
2. Tools to promote a more sustainable circular lifestyle
3. Knowledge-sharing both nationally and internationally



Using mountain water to link local resources with circular fishing industry

Railway tunnels have the potential to be very useful to land-based fish farming facilities around the world. Together with AFRY, the Swiss company **Basis 57** has made use of tempered mountain water from a railway tunnel to build a fully circular, energy-efficient, land-based fish farm with minimal impact on the local environment. —————→

According to the [Global Seafood Alliance](#), the world's population is expected to grow to almost 10 billion and food demand will more than double by 2050. Aquaculture is one of the fastest growing industries globally, and presents a resource-efficient alternative, with lower CO₂ emissions in comparison to other farmed proteins. At the same time, the fishing industry is facing major environmental challenges such as bio-diversity loss due to overfishing of lakes, rivers, and oceans. In search of new sustainable methods and technologies, land-based fish farming presents opportunities to meet the challenges of rising demand and environmental issues. 

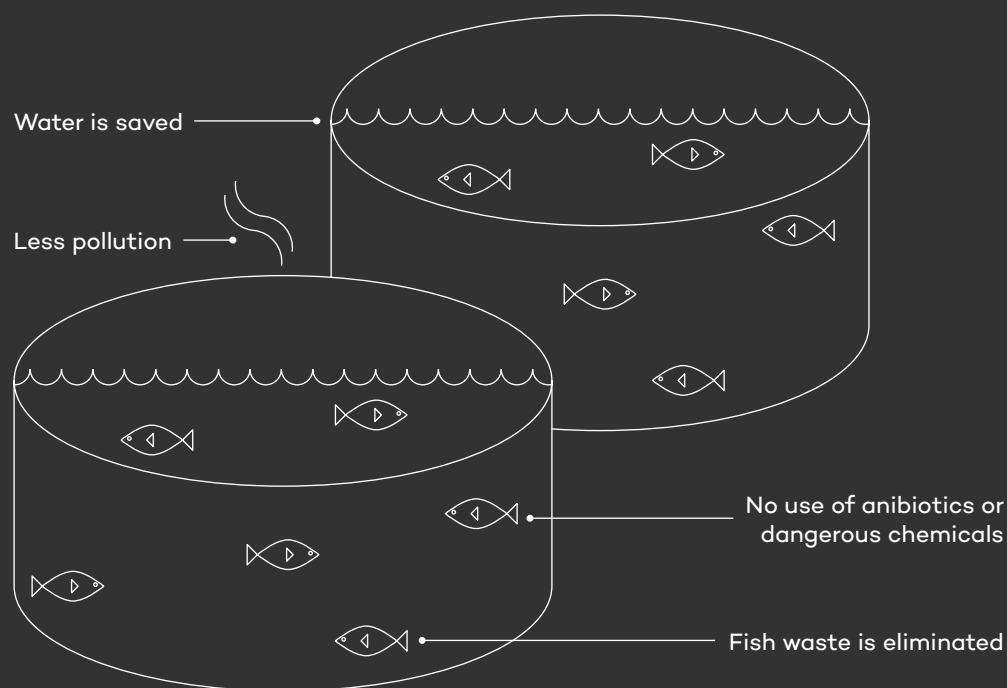


“We want to decrease overfishing in Switzerland and Europe by building a more local and sustainable fish farm”

Thomas Gisler
CEO of Basis 57

Land-based vs. open sea

Farming seafood is typically done in the open sea, in lakes or on land. In contrast to open sea aquaculture in underwater nets, however, Recirculating Aquaculture Systems (RAS) land-based fish farming minimises environmental effects: less pollution, water is saved, fish waste is eliminated, and there is no use of antibiotics or dangerous chemicals.



The company 'Basis 57 nachhaltige Wassernutzung AG', which means 'Basis 57, sustainable water usage corporation', ("Basis 57") has identified a unique opportunity to make use of tempered mountain water for land-based fish farming, in response to the growing need for sustainable fish production and consumption. AFRY's long-standing expertise within land-based fishing industry made it a natural choice to handle project management and steering, architectural and construction design, as well as technical coordination in the building of an industrial plant.



The synergies that make more sustainable fishery

The Gotthard base tunnel is located in the Swiss alps and with its 57 kilometers, it is the longest railway tunnel in the world. During the drilling and construction of the tunnel, the tunnel constructors came across large quantities of warm drainage water from inside the mountain, that had to be managed in order to finish the tunnel construction. This untreated water became a vital source for a sustainable fish farming facility – a natural resource spot for local land-based fisheries.

“When the tunnel constructors drained the water directly into a nearby river, an idea arose to use the mountain water sustainably. Basis 57 had a few suggestions on how we could use the water and decided to create a land-based fish farm”, says Claudio Ferro, Business Development Manager and Head of Project Management Switzerland at AFRY.

In close agreement with local authorities and the railway company, Basis 57 wanted to exploit the resource in the tunnel in a sustainable manner. In collaboration with biologists, and specialists in animal farming and water management, the company combined expertise and local engagement to examine the potential of native fish breeding.

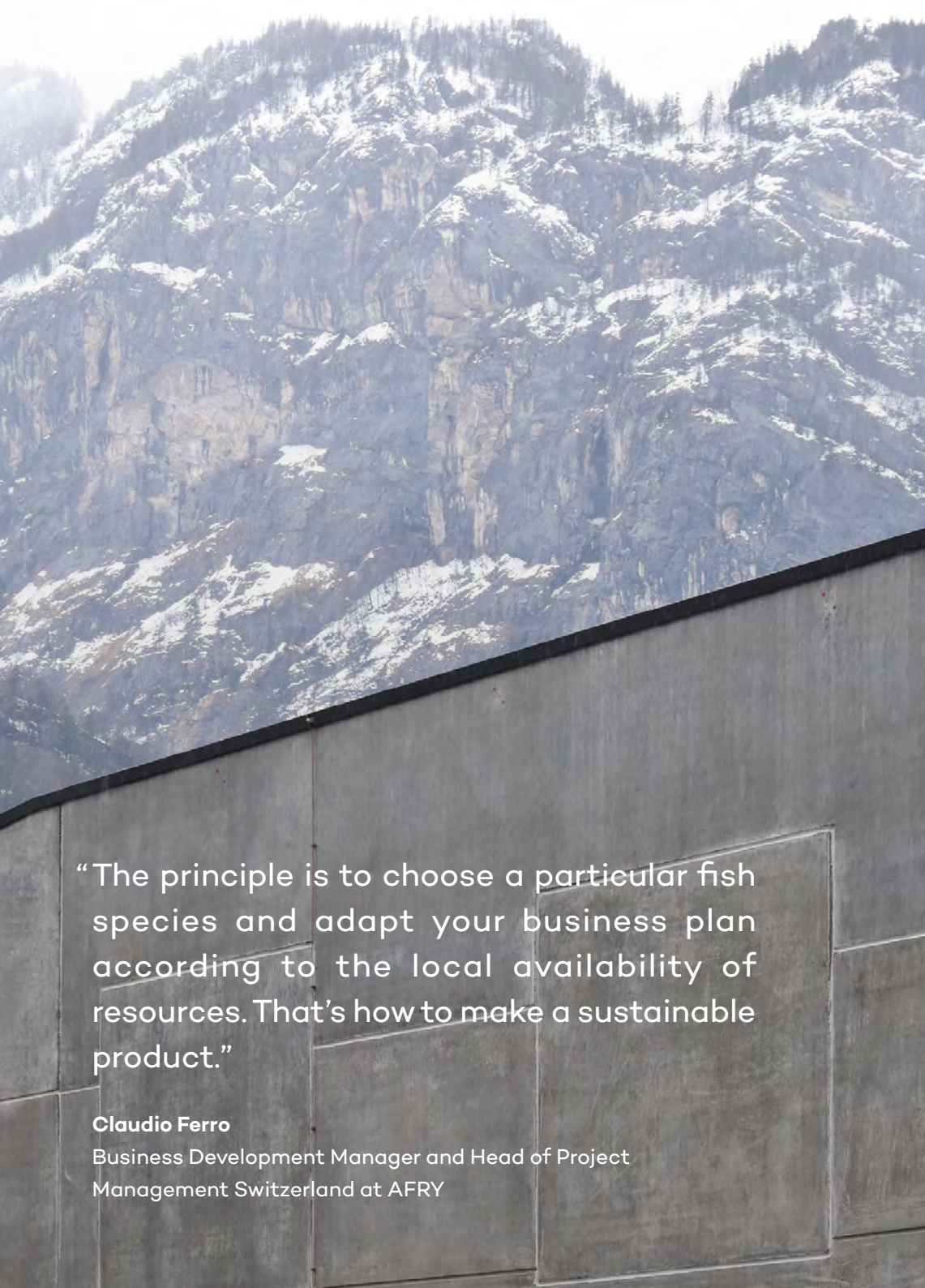
“The project was born in a small canton in Switzerland with many experts and locals sharing their ideas, procuring funds, and contacting small investors. This showed how local citizens can join forces to make something special together – for the sake of the environment”, says Claudio Ferro.

Traditional fish farming facilities require high amounts of energy as well as transportation between different farms over the fish’s lifetime, which generate emissions. With high-quality mountain water, Basis 57 found a way to connect the facility to the natural resource. The water is not only very clean and fish-friendly but is ideally tempered at 13-15°C. Consequently, the mountain water becomes a natural power source in the production, minimising the need for water heating and energy waste, leading to less emissions.

The facility is based on a recirculation system that sustainably reproduces the full product-cycle of farmed fish, from hatching to adulthood to finished packaged fillets. The facility consists of several indoor recyclable water tanks, which are used during the different phases of breeding production, creating the right aquaculture environment. The plant uses the mountain water, which is recycled and treated before it is returned to the river. By using mountain water, nearly 100% of the water gets reused and cleaned from harmful chemicals. All waste products from the fish production can also be reused to produce by-products such as biofuels or animal feed. —————>



The livestock sector plays a vital role in the transition towards a sustainable society. Increasing incomes, changing diets, and population growth have made the livestock sector one of the fastest growing agricultural sub-sectors in middle- and low-income countries. Globally, livestock contributes up to 40% of the total agricultural activity.



“The principle is to choose a particular fish species and adapt your business plan according to the local availability of resources. That’s how to make a sustainable product.”

Claudio Ferro

Business Development Manager and Head of Project
Management Switzerland at AFRY

The fish that meets the local requirements wins

Generally, selection of fish species is mainly based on market demands, and the breeding environment needs to be tailored to the species’ special requirements. The well-known pikeperch was therefore a good match, especially since no suppliers in Europe have been able to deliver pikeperch in constant growth conditions. Basis 57 wanted to exploit this advantage on the market and breed the fish in a sustainable way.

RAS land-based fish farm facilities require very specific sets of circumstances to be able to breed delicate species. Pikeperch is highly sensitive, so it requires carefully monitored production, system management, and technical stability. The building design and construction is also strictly integrated into the local environment since it is very important to preserve the natural landscape in Switzerland.

“Building this type of plant comes with several challenges. The fish are very delicate and require darkness, special fish feed as well as calm and clean water at a very specific temperature. You can very easily end up with mass mortality of fish”, says Gianluca Punzi, Architect at AFRY.

In 2021 the production facility was set in operation, producing 180 tonnes of pikeperch per year in the first phase. The plan is to expand the production capacity of 540 tonnes per year.

“In Switzerland, sustainability is a big trend, yet sustainable consumption comes with a price tag. We need to think carefully about the trade-off between the economy of scale approach and quality.”, says Thomas Gisler. →



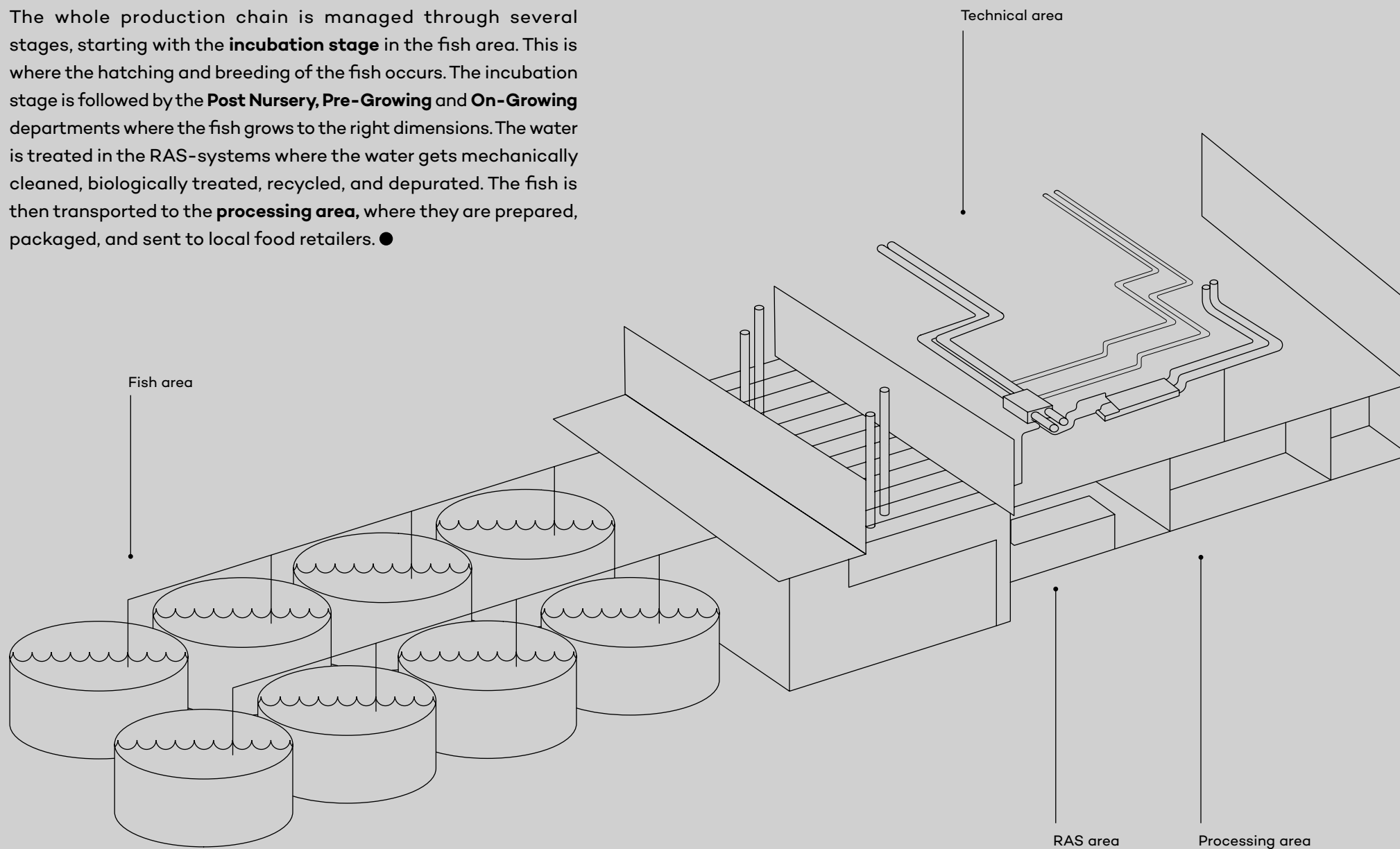
Local fish clusters is the model fit for the future

In Switzerland, domestic fish production covers around 6% of the Swiss fish consumption, while 94% is covered by imported fish. Since consumers increasingly expect affordable access to sustainable, healthy, and locally produced food, the sustainability perspective has been the project's top priority.

“Nowadays, it is not uncommon that fish, especially salmon, is produced in Norway, processed in Poland, and packaged in France before it reaches the consumer. This type of value chain has hugely negative impacts on the environment. With this kind of system, you farm the fish in direct contact with the target market”, explains Claudio Ferro.

The circular economy employs small-scale processes to extend the use of local ecosystems. The Basis 57 project shows how local awareness and small-size production matter. It can serve as a source of inspiration for other food producers, to shape new sustainable fish clusters in their local regions, depending on the environmental conditions and infrastructure. The scalability is therefore very much dependent on new approaches and collaborations, and any expansion of the system requires attention to details and complex solutions. —————>

The whole production chain is managed through several stages, starting with the **incubation stage** in the fish area. This is where the hatching and breeding of the fish occurs. The incubation stage is followed by the **Post Nursery, Pre-Growing** and **On-Growing** departments where the fish grows to the right dimensions. The water is treated in the RAS-systems where the water gets mechanically cleaned, biologically treated, recycled, and depurated. The fish is then transported to the **processing area**, where they are prepared, packaged, and sent to local food retailers. ●



Securing a sustainable transition and future for food and life science

LOTTA FALK, HEAD OF FOOD & PHARMA AT AFRY

The food and life science industries account for 25% respectively 10% of global greenhouse gas emissions, and hence a large proportion of global emissions. Halving emissions in the food and life science sector by 2030 will require urgent actions and solutions to ensure production capacity and sustainable production of the next generation's food, medicine, and medical devices. How can we use less materials, in less time, and still secure the highest quality? And how can we make the operations more digital by connecting the business systems with production?

The Covid-19 pandemic brought to light the importance of these industries in general, and more specifically, expectations on capacity, time to market and sustainability. As in many other sectors, these industries are also seeing an increased focus on sustainability from governments and international institutions, with expanding regulations as a result.

The food, life science and pharmaceutical industries are in general all defined by high regulatory, quality, and efficiency requirements with major expectations globally. AFRY's clients within these sectors have, during the past years and especially with the Covid-19 pandemic, been forced to explore new ways of working to develop, manufacture and deliver efficiently while maintaining the highest level of quality. The biggest enabler to achieve the transformation is an increased use of digital solutions and use cases to both increase data exchange within the value chain, between public and private players, as support to R&D. This in order to enhance the physical products value and quality, to increase operations reliability and efficiency, traceability, transparency, as well as sustainability impact.

“The food and life science industries is in a transition state, focusing on an agenda that ensure efficiency, quality and capacity and at the same time preserve nature and secure the future of our environment.”

Lotta Falk

Head of Food & Pharma at AFRY

Source: The UN. (2017). World population projected to reach 9.8 billion in 2050, and 11.2 billion in 2100. <https://www.un.org/en/desa/world-population-projected-reach-98-billion-2050-and-112-billion-2100>

8.6 bn

The world population has increased drastically since the 19th century and is, according to UN, expected to grow to 8.6 billion in 2030.¹



“Future Food at AFRY is part of the giant food transition and supports companies in the race to find new solutions, manufacturing systems and processes that deliver on key sustainability measures.”

Lotta Falk

Head of Food & Pharma at AFRY

A concrete example is how during the Covid-19 pandemic, the use of digital twins to plan new manufacturing capacity in the pharmaceutical industry has revolutionised the entire system within vaccine manufacturing. The rapid changes have cut years from the development cycle - from approved vaccine to mass scale manufacturing all while ensuring quality and regulatory compliance. A digital twin as an accurate and detailed virtual version of a factory or its assets, gives decision-makers a higher degree of visibility than previously ever before. Advanced digital twins have access to data in real-time, including historical data, which is used to simulate the future based on all possible alternatives. Digital twins can then analyse a production line or entire production plant, both from a risk and an environmental perspective. This enables the companies to change, find new alternatives, and reduce waste, all while minimising time to market.

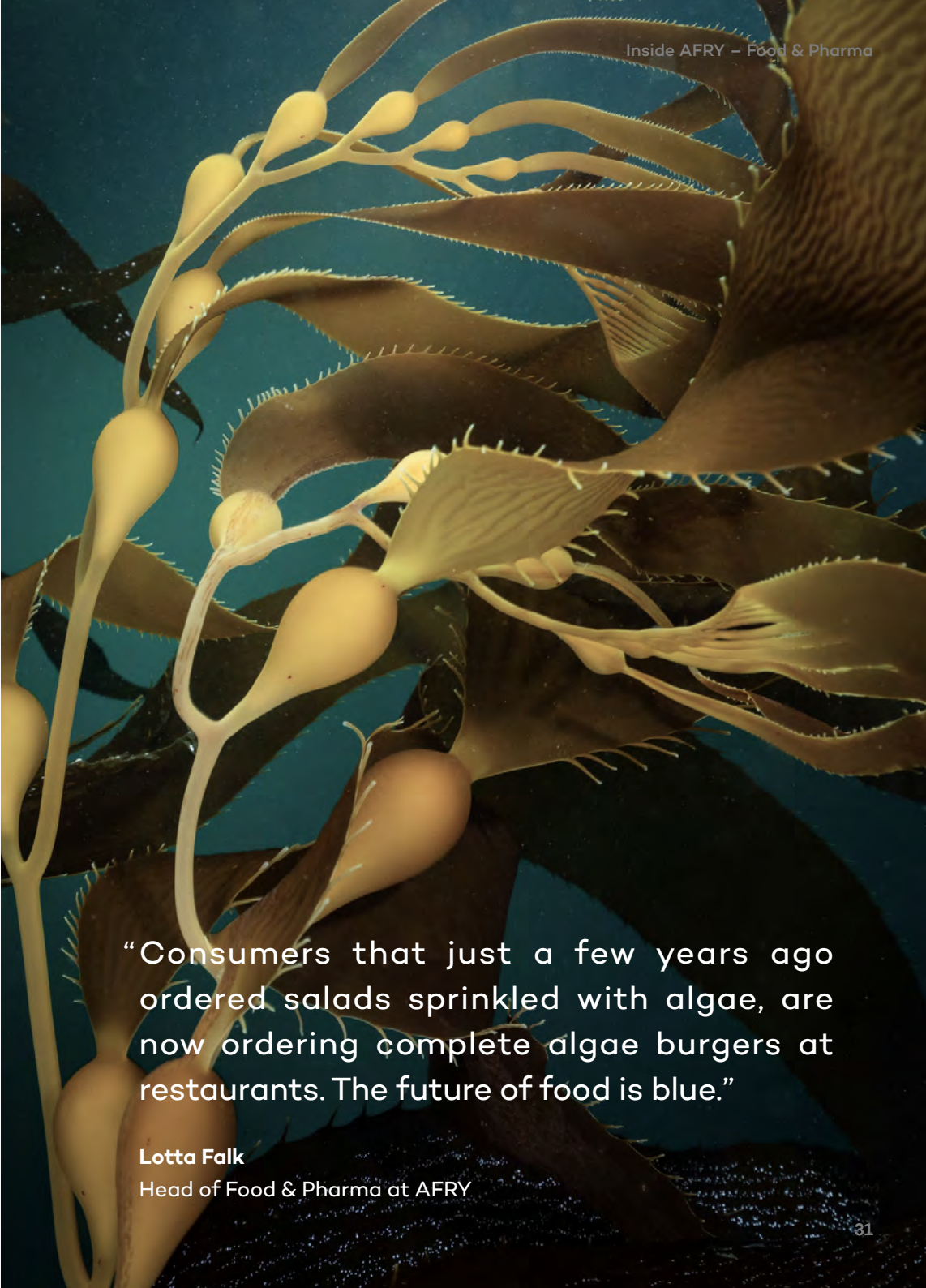
With a growing and aging population, the increasing need for food and its supply is a major challenge. Demand among consumers for real food, that is tasty, healthy, and more sustainable, is also growing. This puts huge pressure on the industry to transform and change food systems globally to ensure supply and quality, while also maintaining sustainable production. Consequently, the global hunt for the most sustainable effects and results on the food system continues. Many companies within the industry have big ambitions and have come a long way in shifting their production, processes, and business models – innovating systems and mechanisms that can reduce the use of fossil fuels, optimise water and energy use, find packaging alternatives, as well as finding ways to reuse and find new materials and source of proteins that have a lower environmental impact. But this is not enough. We need to continue the search for sustainable food alternatives. —————→

To ensure that we meet the demands and needs of the world's growing population, we need to look closer at future food. The demand for alternatives to meat has grown rapidly and will continue to rise, even though the industry still has obstacles to overcome in different parts of the world. The industry winners will be those who find good proteins that can replace meat products in both taste and texture.

The next upcoming area where we see a rising demand globally is in blue food, or aquaculture. And in many parts of the world, it is already a central component in overall food production.

Food from the water, both marine and inland, has great potential both from a commercial and sustainability perspective and it will most likely rise to a high level in a short time frame. The number of giant algae farms and land-based fish farms are growing and many of the newly established fish farms are now allowing the establishment of circular economy clusters in local areas, which can result in limited environmental impact and streamlined logistics.

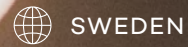
To sustainably increase the blue food production for a growing population, there is a need for scientific facts and advice to improve overall decision-making for the fisheries' assessment and management systems. This development and continued insights and research will ensure food security, nutrition, and transport methods – in the future. ●



“Consumers that just a few years ago ordered salads sprinkled with algae, are now ordering complete algae burgers at restaurants. The future of food is blue.”


Lotta Falk

Head of Food & Pharma at AFRY




Combating homelessness through social innovation

Homelessness among families with children is an inherent problem in both developed and developing countries. In response to rising homelessness among children in developed countries and in Sweden specifically, AFRY has initiated the pilot project, **Children's Housing First**. The project is funded by Sweden's innovation agency, Vinnova, and gathers representatives from the housing industry, politics, and academia, to develop and implement solutions to combat homelessness and housing inequality. —————>

Families experience homelessness for various reasons, one of the primary reasons being a shortage of affordable housing. Sweden, a social welfare country, has struggled with residential instability and growing homelessness for years, in part due to the lack of a cohesive national homelessness strategy. Homelessness affects children's health and social development and limits their opportunities for higher education and future employment.¹ Since the incorporation of the UN Convention on the Rights of the Child into Swedish law, AFRY has taken action to address this critical issue, both locally and nationally, through the establishment of a knowledge alliance in Malmö, which is located in the Skåne region, the southern part of Sweden. AFRY has teamed up with Malmö University, and the non-profit organisations Save the Children Sweden and Stadsmissionen in Skåne. The ambition is to shape a new model that can guarantee housing for families with children, increase equality, and reduce the societal costs associated with homelessness. 

1. Forte. (2020). Allt fler hemlösa i bostadsbristens Sverige. <https://forte.se/artikel/allt-fler-hemlosa-bostads%C2%ADbristens-sverige/>



“What brought us together was the desire to find solutions to transform the lives of families suffering from homelessness, since every child has the right to the best possible start in life. By combining Malmö University's expertise and the non-profit organisations' detailed knowledge of the target group together with AFRY's project control and management, we wanted to develop solutions with a practical application, as well as raise our own competence in this issue.”

Hannah Wadman

Urban Planner and Project Manager at AFRY



An innovative solution that breaks traditional patterns

Despite Sweden's extensive welfare system, homelessness continues to be a critical issue. It has traditionally been viewed as a social problem, however, families suffering from structural challenges such as housing shortages and unemployment are increasingly being added to the homeless as a group. Statistics presented by the National Board of Health and Welfare showed that 11,400 parents and 15,000 children were homeless in 2017. The number of homeless families increased by more than 1,900 from 2011 to 2017.² Unfortunately, current Swedish housing policies are not adjusted to the structural causes of homelessness. Especially since the Swedish housing market has become very market-driven, making it nearly impossible for low-income earners to secure affordable housing. Additionally, the social safety net is not able to catch everyone, thus forcing families suffering from structural homelessness to live in insecure housing situations.

2. Socialstyrelsen. (2017). Hemlöshet 2017 – omfattning och karaktär. <https://www.socialstyrelsen.se/globalassets/sharepoint-dokument/artikelkatalog/ovrigt/2017-11-15.pdf>

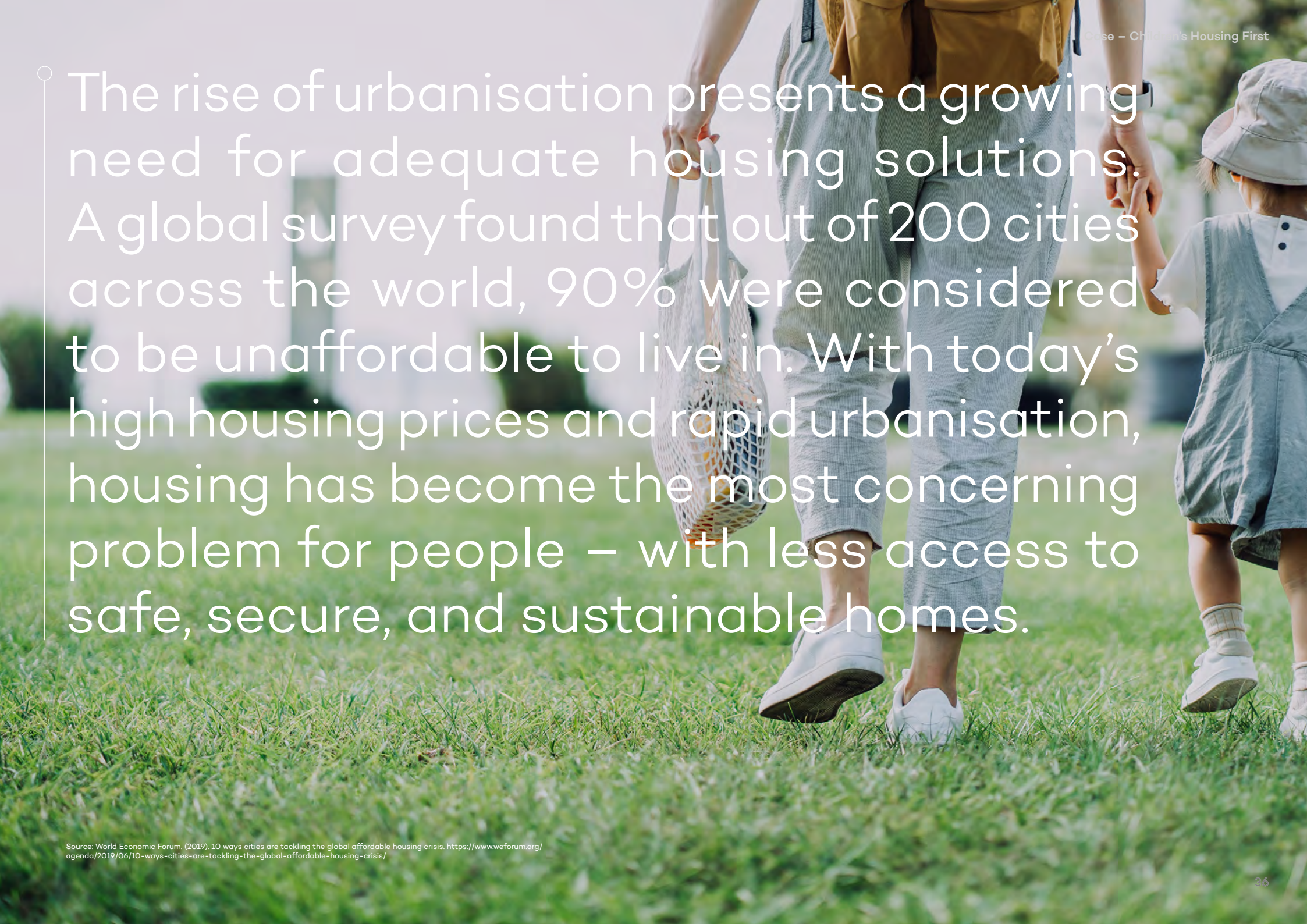
The difference between structural and social homelessness

Municipalities divide homelessness into structural and social homelessness. Housing shortages, divorce and unemployment are factors related to structural homelessness, while social homelessness often stems from mental illness and substance abuse.

“One third of homeless families do not have specific needs to address beside permanent housing. We wanted to find a solution to this type of homelessness irrespective of the cause, since the definition of homelessness as structural or social is often arbitrary. There is a need to support families who have ended up homeless, regardless of the reason.”, says Hannah Wadman.

In 2020 the project team held four workshops with relevant social actors, such as non-profit organisations, municipalities, private property owners, and governmental agencies. The ambition was to evaluate existing tools and methods and develop new models and solutions. Previous shortcomings in social housing have been a product of the lack of cooperation between various stakeholders.

“The purpose of the project has been to create a cross-sectoral partnership, where access to expertise, knowledge and resources can be shared and utilised to counteract homelessness among families with children”, says Hannah Wadman. —————>

A photograph of a person and a child walking away from the camera on a grassy field. The person is wearing a yellow backpack, grey trousers, and white sneakers, and is holding a woven basket. The child is wearing a light blue dress, white socks, and white sneakers, and is holding the person's hand. The background is a blurred green field and a white building.

The rise of urbanisation presents a growing need for adequate housing solutions. A global survey found that out of 200 cities across the world, 90% were considered to be unaffordable to live in. With today's high housing prices and rapid urbanisation, housing has become the most concerning problem for people – with less access to safe, secure, and sustainable homes.



“Our idea is to work with preventive measures and to guarantee housing to families with children from day one.”

Hannah Wadman

Urban Planner and Project Manager at AFRY

Affordable housing the foundation for combating long-term homelessness

The goal of the Children's Housing First project has been to develop a model inspired by the previously successful Housing First model and the Finnish Y-Foundation model. These models, which mainly focus on people suffering from social homelessness, consider social housing a starting point rather than an end goal, where effective social services and thoughtful state-sponsored production of accommodation can lift people out of homelessness. These initiatives have shown positive results, not only in higher housing retention rates, but also in social inclusion. AFRY's project attempts to transfer success factors from the Housing First model to a model that focuses primarily on families with children.

“Innovation is often thought of as something new and groundbreaking. But innovation can also be about applying existing knowledge in new ways. In this project we explored how an established model could be applied to a different context and a new target group”, says Hannah Wadman.

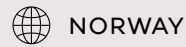
The proposed model is divided into a short- and a long-term approach. The short-term approach guarantees vulnerable families access to preventive measures for up to three months. The measures include childcare and social activities. Additionally, property owners

are offered subsidies from the municipality to offer affordable housing to the families during this time period. These preventive measures ensure families a long-term sustainable housing solution, as well as supporting them towards financial independence. The short-term methodology will serve as a guiding example to stakeholders of how housing inequality and homelessness among families with children can be addressed in the long-term approach, through a new housing policy framework where housing should be seen as a social right. This will serve as a tool to affect ongoing governmental investigations and the political agenda for a national homelessness strategy.

In order to implement this model, AFRY is now passing the baton to Stadsmissionen to further investigate how the model could be implemented at municipal level.

“In order to scale up, financial resources will be needed – both from the private as well as the public sector. Additionally, dialogues with local property owners are required to raise awareness. In our society, we have the competence, the money, and the housing, but we need to be even more proactive to ensure that no child has to grow up in homelessness”, says Lena Wetterskog Sjöstedt, Director at Stadsmissionen in Skåne. ●






NORWAY

Fossil-free cement on the horizon – World's first carbon capture cement plant

The urgent climate crisis is putting pressure on highly emitting industries to decarbonise. But how do we transform existing industries without jeopardising production streams of fundamental value chains throughout society, such as construction, infrastructure, and transportation? Advansia, part of AFRY has partnered with the cement manufacturer **Norcem** in the development of the world's first cement factory that captures the carbon dioxide released in the process. —————→

ADVANSIA
PART OF AFRY

The demand for concrete is rapidly increasing worldwide. Cement is the glue in concrete, and while the material is one of the most cost effective and well-suited for construction, the carbon footprint from the cement industry accounts for around 6-8% of CO₂ emissions globally. Cement production requires a lot of energy and has historically been dependent on fossil fuels such as oil or coal for firing up ovens. Newer methods largely involve renewable fuel. Approximately two thirds of cement-related CO₂ emissions, however, do not stem from the expenditure of fuel. Instead, carbon dioxide is released from the processing of limestone – an inevitable part of cement production¹.

Governments, businesses, and organisations worldwide highlight technologies for carbon capture and storage (CCS) as a viable alternative for reducing emissions from industrial processes, but the technology has not been fully tested in large scale industrial production. 

1. Olivier JGJ et al. (2015), Trends in global CO₂ emissions 2015 Report, The Hague: PBL Netherlands Environmental Assessment Agency; Ispra: European Commission, Joint Research Centre. https://www.pbl.nl/sites/default/files/downloads/pbl-2015-trends-in-global-CO2-emissions_2015-report_01803_4.pdf



The number of carbon capture facilities have steadily increased during the past decade, from 8 operational facilities in 2010 to 21 being operational in 2020. More than 30 integrated carbon capture facilities have been announced since 2017, mostly in the US and Europe.



“When Norcem Brevik’s facility is up and running, around 1.3 million tonnes of fossil-free cement will be produced annually with 400,000 tonnes of CO₂ captured.”

Gunnar Laastad

Engineering manager at AFRY (Advansia)

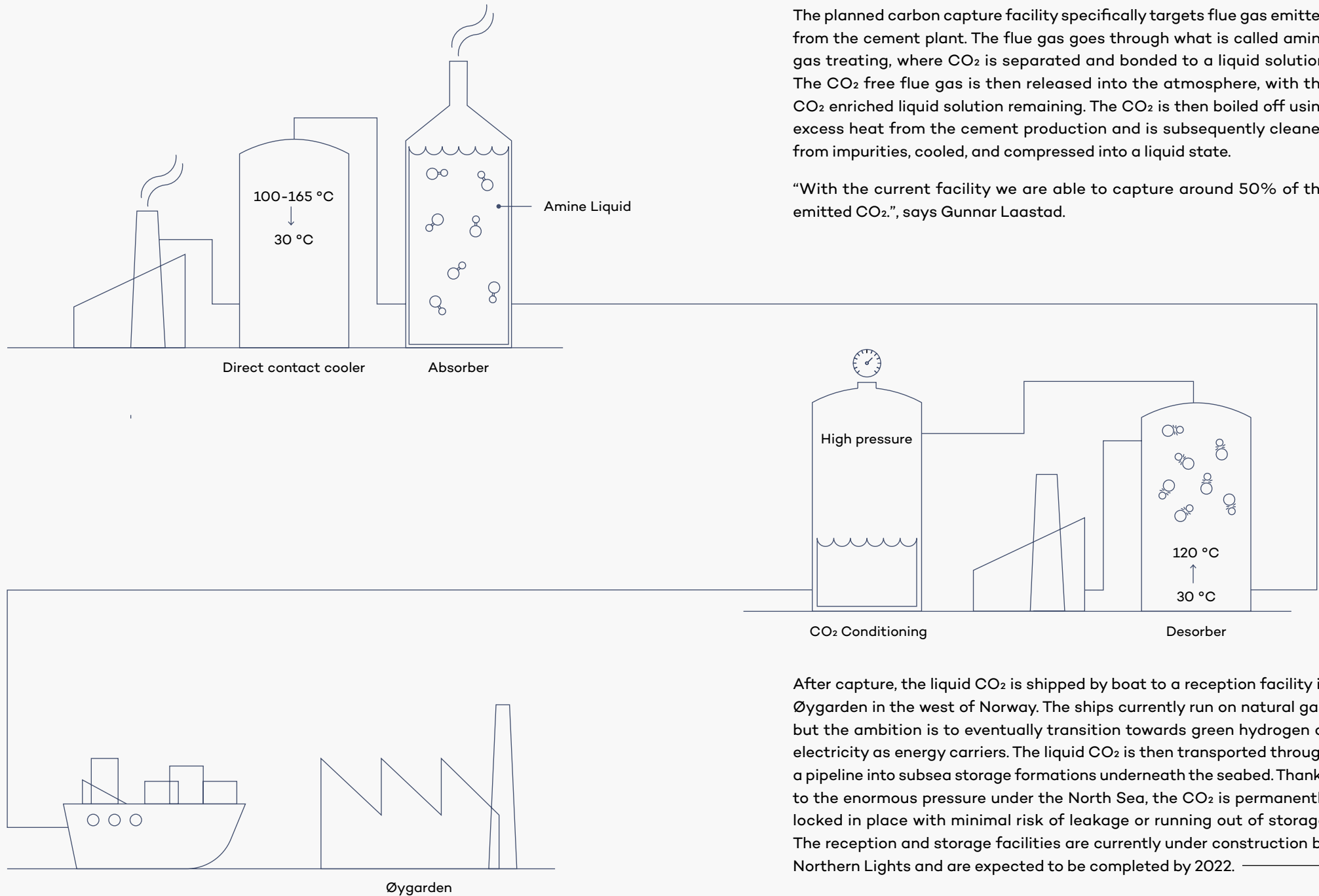
Norcem, a part of the HeidelbergCement Group, has performed pilot testing of the capture technology and is now building and integrating a full-scale flagship CCS facility into their existing cement plant in Brevik, Norway.

“Carbon capture is a costly undertaking in a competitive environment, and it takes visionary project management and a lot of resources to be a pioneer in the industry.”, says Per Brevik, Director of Sustainability and Alternative fuels at Norcem Heidelberg Cement.

Cutting-edge technology up and running by 2024

AFRY, represented by its subsidiary Advansia, has played a key role in the project development and has been responsible for various parts of the planning and implementation of the CCS technology at Norcem, such as coordination of engineering and interfaces, evaluation of project models and contract strategy, follow-up on technology providers and being a general advisor for the integration.

The carbon capture facility’s integration with the cement plant will be completed in the summer of 2024, making the Norcem plant in Brevik the world’s first cement production plant with integrated carbon capture storage technology. —————>



After capture, the liquid CO₂ is shipped by boat to a reception facility in Øygarden in the west of Norway. The ships currently run on natural gas, but the ambition is to eventually transition towards green hydrogen or electricity as energy carriers. The liquid CO₂ is then transported through a pipeline into subsea storage formations underneath the seabed. Thanks to the enormous pressure under the North Sea, the CO₂ is permanently locked in place with minimal risk of leakage or running out of storage. The reception and storage facilities are currently under construction by Northern Lights and are expected to be completed by 2022. →

Governmental support needed in transition towards CCS-solutions

While there is considerable potential for CCS-technologies in decarbonising heavy emitting industries, it remains a costly process both to implement and operate the facilities. Two thirds of the costs associated with the Norcem Brevik project stem from integrating the carbon capture facility into the continuously running cement plant without interrupting production. Construction has been ongoing for the past year at Norcem Brevik, but plenty of work remains before the technology can be fully built into the system. One of the main difficulties is installing certain components during the plants limited scheduled maintenance stops that only run for three weeks each year. Political support and financing are therefore crucial for developing the technology to become a financially viable option.

“Consumers and companies are willing to pay a premium for fossil-free cement, but only up to a certain price point. Governments have a central part to play now, but the need for national funding will most probably lessen as fossil-free cement becomes more competitive and profitable”, says Per Brevik.

Industrial scale-up coming soon

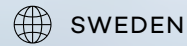
The flagship plant in Brevik is an important step in demonstrating the CCS technology at full industrial scale. Norcem currently leads eight other carbon capture projects in HeidelbergCement Group where one potential initiative involves implementing carbon capture technology in cement production in Slite, Sweden. Once operational by the preliminary date of 2030, an estimated 1.8 million tonnes of CO₂ will be captured annually at the plant. ●

“Our project will demonstrate to the entire cement industry how the infrastructure surrounding a carbon capture facility can be built. Lessons from our project will pave the way for other industries’ decarbonisation.”

Per Brevik

Director of Sustainability and Alternative fuels at Norcem
HeidelbergCement






Seeking road safety synergy effects in digital and physical infrastructure projects

As a road operator, the Swedish Transport Administration (**Trafikverket**) is naturally focused on projects with long horizons. In the short-term, however, the governmental agency must also ensure that road infrastructure is optimised for rapid technological advances in the vehicle fleet. To bridge the gap between current infrastructure and future vehicle technologies, AFRY helped Trafikverket to converge with vehicle developers to meet road safety targets.



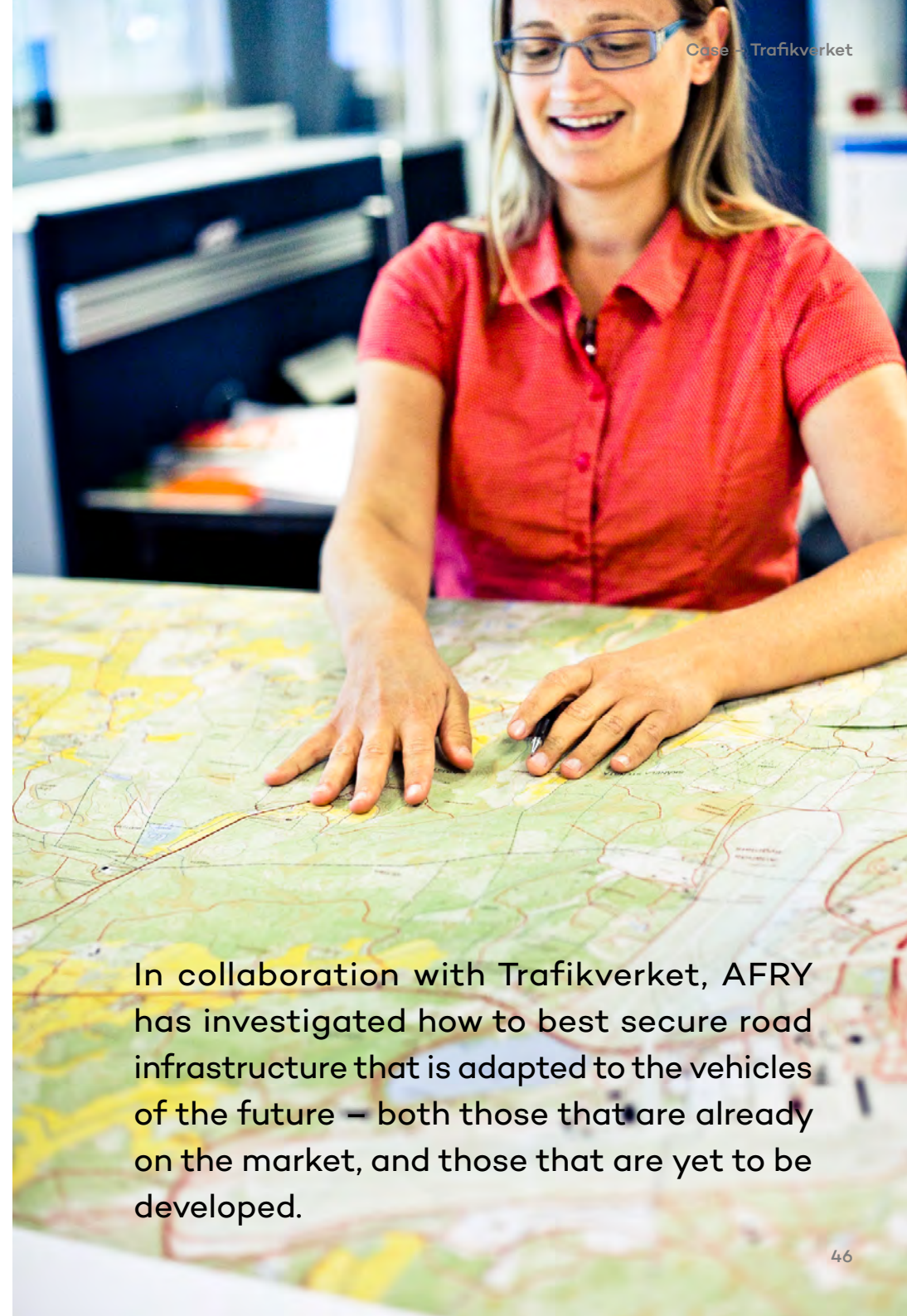
Road safety relates to many of the Sustainable Development Goals (SDGs), for example SDG 3: Health, SDG 4: Education, SDG 10: Reduced inequalities, SDG 11: Sustainable cities, and SDG 13: Climate action.¹

The accumulation of these SDGs can be seen in the Swedish Government's new road safety target for 2030: to halve the number of traffic fatalities and reduce the number of serious injuries in traffic accidents by 25%. This new target is closely connected to the government's "Vision Zero" for road safety – an ethical standpoint that no-one should be killed or suffer lifelong injury in road traffic.²

At the same time, vehicle development has been progressing at an increasingly rapid pace, with new technologies digitising and automating large parts of the vehicle fleet. By 2025, around 85% of all vehicles produced globally will have some type of driver assistance functions, also known as ADAS. With the help of ADAS, many accidents can be avoided, and lives saved. 

1. Youth for road Safety. (2021). The Global Coalition for Road Safety launches SDG Youth Champions. <http://www.youthforroadsafety.org/news-blog/news-blog-item/t/coalition-launches-sdg-youth-champions>

2. Trafikverket. (2020). This is Vision Zero. <https://www.trafikverket.se/en/startpage/operations/Operations-road/vision-zero-academy/This-is-Vision-Zero/>



In collaboration with Trafikverket, AFRY has investigated how to best secure road infrastructure that is adapted to the vehicles of the future – both those that are already on the market, and those that are yet to be developed.



Backcasting to identify effective measures

Planning and expansion of traffic infrastructure is a long-term process, and the resulting roads, bridges and highways have a long service life. On the vehicle side, however, technological development is happening fast.

Instead of letting the technology set the agenda, AFRY used a method called backcasting, in which the 2030 traffic safety target was used as a starting point to identify measures to take in the present in order to reach the goal. Backcasting is a planning method that starts with defining a desirable future, and then working backwards to identify policies, programmes and measures that will connect that specified future to the present.

“It’s imperative that Trafikverket and vehicle developers work in close collaboration. But the difference in perspective – with the agency’s big infrastructure projects having such a long-term scope, while the advancements in cars are moving so fast right now – it makes it hard to know where to start”, says Maria Håkansson, Market Area Manager at AFRY. “By defining a concrete target as a starting point, we can use backcasting to identify the measures we need to take today to reach our target in the future.”

Collaboration around challenges to identify synergy effects

In order to accelerate the transition towards a sustainable society, innovative collaboration was needed between a wide range of functions, stakeholders, and experts to seek synergies between vehicle developers and road operators to both create better products, and achieve increased road traffic safety. A novel approach to strengthening both digital and physical road infrastructure.

In addition to intensive collaboration with vehicle developers, the AFRY team drew on their wide contact network for multi-disciplinary input into the project. Internally at the agency, different disciplines worked closely together throughout the entire project.

“There has been a constant interplay with our experts to check that the short-term measures that we are looking at are in line with what is required in the future. We had to be sure that we weren’t locking ourselves into solutions that won’t serve us in the long term,” says Louise Olsson, Analyst at Trafikverket. —————>



A bold vision:

Trafikverket's vision is that "everyone arrives smoothly, the green and safe way." This means that Trafikverket creates the conditions for a robust and efficient transport system that is both energy-efficient and safe.

Although the scope of the project and all the different competencies involved made it complex, one of the most interesting findings in the project is surprisingly simple: that gradually adapting traffic infrastructure for tomorrow's vehicles doesn't require re-building or building new infrastructure. "What we actually need to focus on is maintenance. What are we really maintaining and why? How is everything connected?" says Maria Håkansson at AFRY.

The result of this intense collaboration with vehicle developers are four strategic focus areas and measures to take advantage of new possibilities arising from digitalisation, development of the vehicle fleet and service development. The focus areas are clear road markings, consistent physical and digital speed limit information, clear and directive physical infrastructure, and requirements in procurement processes. ●

"Together with AFRY, we were able to establish real collaboration with the industry to look for synergy effects and feasibility and make big complex issues tangible and more easy to tackle."

Louise Olsson

Analyst at Trafikverket

Managing digitalisation to accelerate the transition towards a sustainable society

A man with a beard is wearing VR goggles and holding a controller, looking into the virtual world. The background is dark, and the lighting is focused on the man's face and hands.

PER KRISTIAN EGSETH, HEAD OF AFRY X

Digitalisation continues to transform our societies and the ways we behave. This has resulted in extensive changes for businesses and their way of doing business around the globe. Now it's time to take the next step to exploit the full sustainability potential released by this digital transformation. —————>

A portrait of Sara Lindstrand, a woman with dark curly hair, wearing a black blazer over a white t-shirt, a gold watch, and a necklace. She is standing outdoors with a brick wall in the background.

“The digital transformation could unleash systemic change that, correctly designed, has the potential to accelerate the decarbonisation of the sectors with the highest emissions. But this also requires that infrastructure planning, legislation, business models, financing and more are combined to fully support a green digital transformation.”

Sara Lindstrand
Director of Sustainability at AFRY

If technologies and processes are designed in line with the right actions and criteria, based on a holistic view there is no doubt that digitalisation has the potential to be a key enabler in the transition towards a sustainable society since it cuts across all dimensions of sustainability. Nevertheless, developing and implementing exponential sustainable solutions requires a systematic approach and disciplined focus on the potential risks and benefits of digital technologies.

Today, digitalisation including smart technologies, digital tools and AI can be used in different industries to increase resource and energy efficiency, optimise lean and resilient supply chains, and facilitate behavioural change towards sustainable consumer behaviour. This in turn could lead to increased sustainability performance. Today, many industry sectors are still in the midst of their digital transition journeys and the transformation in many sectors therefore represents a staggering potential for sustainability impact. It's important to keep up the speed in the digital transition since the avoided emissions from digital solutions, is expected to outsize its footprint by far and even reduce global emissions by 15%¹ which is one-third of the emission reduction that is needed to keep global warming under 1.5°C degrees by 2030. —————→

1. World Economic Forum. (2019). Digital technology can cut global emissions by 15%. Here's how. <https://www.weforum.org/agenda/2019/01/why-digitalization-is-the-key-to-exponential-climate-action/>

Even if digitalisation is an enabler in many cases however, it is not the one and only solution. If mismanaged, digitalisation could lead to unfavourable practices and environmental degradation. In addition, the CO₂ footprint of the global digital infrastructure is already significant and is expected to grow.¹ We have plenty to learn from past experience that we can bring with us to achieve desirable results and accelerate the sustainability transition.

The urgent need for the sustainability transition is paving the way for rapid digital-driven change. At AFRY X we are supporting sectors facing digital disruption and create value by bringing together partners, leading digital expertise and key digital technologies in one place. This to enable businesses to make and accelerate digital transformations efficiently – and sustainably. ●

About AFRY X

AFRY X offers sector knowledge, digital competence and sustainability expertise for businesses' and sectors globally supporting them on their digitalisation journeys.

Head of AFRY X: Per Kristian Egseth

People: 800 employees and digital experts mainly in Europe

1. The World Resources Institute. (2020). www.ourworldindata.org.



“If we can drive value for our clients and core sectors through digital technologies and processes that ensure efficiency and good results – and at the same time deliver on sustainability – then we have succeeded.”

Per Kristian Egseth
Head of AFRY X



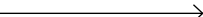
BRAZIL

A significant shift in the pulp and paper sector

The Pulp and Paper industry is a significant global industry sector, with expected market size of approximately USD 370 billion by 2028, which currently is going through a substantial transformation. Today, tissue and packaging papers are driving the future increase of demand, while publication papers continue to face decline.

Source: Fortune Business Insights

Pulp mills are production platforms for pulp, papers and boards as well as energy in the form of steam and electricity. However, new technologies are transforming the mills into biorefining platforms where side-stream products and industrial clusters plays a key role.

While the global pulp and paper output increased by over 25% between 2000 and 2018 the sector's energy use only increased by 6% indicating a more energy efficient industry. The industry has become increasingly energy self-sufficient by taking more than half of its primary energy need from biomass instead of fossil fuels, and thereby emitting less CO₂¹. Increasing focus of the sector is also on procuring sustainable raw material and improving forest management practices. In addition to fibre raw-materials, circular economy solutions are visible when around 58% of all fibres used for paper and paperboard production globally nowadays comes from recovered paper². Despite improvements, the industry still faces challenges and continues to focus on increasing water and energy efficiency as well as establishing an environmentally sound management of chemicals and industrial waste. 

“We can now see a major shift in the pulp and paper industry in several markets, with major progress in technology which could accelerate the transition and potentially revolutionize the whole industry. This encourages AFRY to further innovate solutions covering the whole value chain to improve efficiency and environmental performance. Especially in crucial areas like water”

Mårten Krogerus,

Technology specialist Sustainability services,
Sales Director at AFRY Finland

1. Food and agriculture Organization of the United Nations
2. AFRY Management Consulting market reports 2020 and 2021



Packaging materials are driving the growth

Containerboards have been used for packaging since the early 19th century. Recent increase in demand for packaging materials are driven by fast adoption of e-commerce, which boosts transport packaging usage. The Covid-19 pandemic has further accelerated this change. More sustainable packaging is also needed to meet the growing number of initiatives to reduce the use of fossil-based plastic packages; fibre-based packaging materials, such as corrugated boards made of recycled fibre-based liners and kraftliners, are expected to gain an increasing market share due to their high environmental performance.

Fibre-based packaging papers and boards incorporate several types of products. The three main categories are cartonboards, packaging papers and containerboards. Cartonboards are frequently used for packing food and liquids, pharmaceuticals and cosmetics, for example. Typical packaging papers are used in e.g., paper sacks, bags and wrapping solutions. Containerboards are predominantly used in a combination of materials forming a corrugated board – they are mainly used for the protection of products during shipping and storing. —————>



20 %

AFRY seeks opportunities to reduce the water use in the chemical pulp production by 20% or more.

Key initiatives to pursuit the sustainability journey

AFRY's longstanding focus on the bioindustry as a transforming segment is part of the overall strategy to accelerate the sustainability transition. AFRY has throughout the years helped the pulp and paper industry with its challenges and sustainability improvements, drawing experience from pulp and paper projects in key global markets including Latin America. This includes addressing the pulp processing by supporting development of more efficient technologies in terms of raw material, chemicals as well as water and energy use. Also, efficient energy management in pulp mills has been in focus to enable optimal generation of electricity, in order to enable export to the national grids. An efficient energy management covers efficiency in all areas including steam use and secondary heat systems operation.

A crucial component in the pulp and paper industry is water usage. Through its water savings commitment, AFRY seeks opportunities to reduce the water use in the chemical pulp production by 20% or more. This is achieved by optimising the process water systems, by increasing recovery and recirculation of non-contaminated water, by employing technologies with low water use, as well as, by installing necessary internal separation processes. Reducing the water usage go hand in hand with energy savings and, thus, opportunities to gain more power and electricity to the local grid. —————>

A pulp and paper partnership in Brazil with results

AFRY's presence in Brazil stretches over half a century, with the first operations already taking place in 1969 under the Pöyry flag and has become a success story with over 1000 employees in 2021 and positioned as the market leader in pulp and paper mills developments across the country. AFRY's joint action and long partnership with Klabin, the largest packaging paper producer and exporter in Brazil, will continue to help supplying the market in a time of strong demand for packaging.

Challenging the conventional way

While many tree types could be used for pulp-making, the conventional method for producing kraftliners is to use softwood pulp from coniferous trees such as pine or spruce, which have long fibres that results in stronger paper. These take long time to grow and is only ready for harvest after 15 to 80 years. Klabin, with a market share of 42% of all kraftliner production in Brazil, saw a golden opportunity to combine additional shareholder value with improvements in sustainability by introducing an innovation: production of kraftliners based on short-fibres.

After researching consumer habits and market trends, Klabin discovered that the market potential of eucalyptus fibre kraftliner paper was huge. In 2019 Klabin, using their own developments and knowledge, paper machine technology sourced from Valmet, the Finnish technology supplier, and with AFRY executing engineering for the Balance of Plant (BOP), became the world's first producer of kraftliner made from 100% eucalyptus through their Puma II project.



This innovative product with improved physical properties came to be called Eukaliner®. Klabin can reap the rewards much quicker thanks to the eucalyptus trees' significantly shorter growing period – they are ready for harvest after only seven years.

By using eucalyptus instead of pine, Klabin only needs a tenth of the planted forest area which brings environmental benefits, while the shorter time to harvest helps to further meet the increasing demand for high-quality paper packaging.

AFRY helped Klabin to meet increased demand in a sustainable way

In 2019 Klabin announced the Puma II project which entails the construction of two new pulp integrated paper machines to produce kraftliner paper. In August of 2021, Klabin started operating the first phase of two with engineering, procurement, and project management support from AFRY. During the first phase, AFRY was responsible for developing the BOP (Balance of Plant) and EPCM (Engineering, Procurement, Construction Management) scope, which included the engineering and project management services of the complementary plants and inter-connections between the process islands during the first phase. AFRY has been involved in the project since its inception, carrying out the conceptual study and the basic engineering as well.

The plant is situated in the municipality of Ortigueira in the state of Paraná and the paper machine (PM27) has the capacity of producing 450,000 ton of Eukaliner® paper, paper produced exclusively from eucalyptus fibre, per annum. The two phases project is an important part of Klabin's growth journey and the investment, being the largest in Klabin's company history, amounts to approximately USD 2.4 billion. —————>

“We are very proud to be part of a project on the scale of the Puma II, bringing our expertise in engineering and contributing with the most advanced technologies from a sustainability perspective. The bio-based industry has a fundamental role in the transition towards sustainable economy, and the Puma II project is a reference into this direction, generating value for all project parties”

Fábio Bellotti da Fonseca

President of AFRY Process Industries in Americas

98 %

Of the waste from production will be reused, such as fertilizers and soil correctors.



Sustainability as an integral part of Klabin's strategy

The Puma II project aims at reducing the environmental impact while increasing production capacity. One of the highlights of this project is the implementation of a biomass gasifier responsible for generating fuel for the lime kiln from wood chips (biofuel) in order to replace fossil fuel. Another highlight is that 98% of the waste from production will be reused, such as fertilizers and soil correctors.

Klabin commits to reduce GHG emissions and also to hold higher standards for atmospheric emissions and effluent quality. The water used will undergo tertiary treatment to ensure that the water returned to the rivers is better than environmental agencies requirements. The Puma plant has been able to reduce specific water consumption, all in line with the overarching corporate strategy aiming to be a global reference in responsible solutions. In addition to environmental aspects, the project employed 9,500 workers during the construction and created 1,500 direct and indirect jobs after the operational start-up.

Fortune favours the bold

By combining technology advancements, extensive experience in project management and engineering, and a company willing to invest and challenge the status-quo, this project demonstrates that economic gain and environmental improvement can be concurrent forces rather than opposing and can also function as a call to action for others to follow suit. ●





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