
Impact
Report
2024
leaps
BAYER

Leaps by Bayer is more than a corporate venture fund — it is a commitment to future generations.

Contents

The world is currently grappling with a multitude of pressing global challenges that threaten human health, climate, and food security on an unprecedented scale

Ag

2.3B

people globally faced moderate or severe food insecurity

34%

of global anthropogenic greenhouse gas (GHG) emissions caused by the agrifood system

70%

of freshwater is used by the agrifood system[3]

Health

1.3B

adults worldwide are affected by hypertension[4]

41M

deaths annually caused by cardiovascular diseases, cancer, and diabetes

Call to Action

Ag Challenges

As of 2023, over 730 million people worldwide suffered from hunger, and over 2.3 billion globally faced moderate or severe food insecurity, according to the Food and Agriculture Organization (FAO)[1]. The global population is projected to reach 9.7 billion by 2050[2], further straining the agrifood system which to date is responsible for 34% of global anthropogenic greenhouse gas (GHG) emissions, uses half of the globe's habitable land surface and accounts for 70% of freshwater use[3].

Health Challenges

Meanwhile, health challenges are escalating, with chronic diseases such as cancer, diabetes, and heart conditions affecting millions of lives. As of the latest data from the World Health Organization (WHO), an estimated 1.3 billion adults worldwide are affected by hypertension[4], a major risk factor for heart disease. Additionally, around 537 million adults globally live with diabetes[5], and approximately 20 million new cancer cases were reported in 2022 alone[6]. These chronic diseases—cardiovascular diseases, cancer, and diabetes—collectively contribute to over 41 million deaths annually, accounting for 71% of all deaths worldwide[7].

> **These figures highlight the critical need for innovative solutions to address the growing burden of global warming and the rise of chronic diseases.**

Letter from Juergen Eckhardt

“To create meaningful change

Leaps by Bayer was born out of a recognition that the world's most pressing problems—especially in health and agriculture—cannot be solved with traditional approaches alone. We face a dual crisis: a global health burden marked by chronic diseases like cancer, diabetes, and cardiovascular conditions, and a food security challenge that leaves over 800 million people hungry and malnourished[8]. These crises are exacerbated by climate change, resource scarcity, and inequalities in access to care and nutrition. We understood early on that to create meaningful change, we needed to think and act differently.

Since our founding in 2015, our mission at Leaps by Bayer has been bold but clear: to tackle ten huge challenges that will have a profound impact on humanity. These challenges, ranging from curing cancer to reducing the environmental footprint of agriculture, demand not just incremental improvements but transformative breakthroughs.

Our investment strategy is driven by the belief that breakthrough innovations, those that can shift paradigms and create entirely new solutions, are essential. We focus on early-stage technologies that have the potential to fundamentally alter the trajectory of health and agriculture. For example, in healthcare, we invest in technologies like gene editing and cell therapies that could cure diseases rather than just manage them. In agriculture, we support innovations in precision agriculture, alternative proteins, and sustainable crop protection, aiming to feed a growing population while preserving our planet.

Impact investing lies at the heart of what we do. However, the journey has not been without its challenges. One of the most significant has been the lack of standardized metrics to measure the true impact of our investments. Traditional financial metrics alone do not capture the societal and environmental value that our portfolio companies aim to create. In an economy with limited resources, making informed decisions is crucial. We need measures that enable us to understand which technologies will have a greater long-term impact on the wellbeing of the population. A metric that can help us determine which leap for humanity would take us the furthest.

To address this, we developed a measurement system together with the independent research organization The Happiness Research Institute, one that better aligns with our mission. This bespoke framework allows us to assess the current and future impact of our investments, ensuring that we are not just investing in innovation but in meaningful, sustainable change. In our first Impact Report we would like to showcase the potential in driving transformational change that lies in our portfolio. We will map our 10 Leaps to the Sustainable Development Goals, explain our impact measurement, present our portfolio's impact magnitude and showcase our impact based on individual portfolio case study examples, ending with an outlook of upcoming impact initiatives.

Leaps by Bayer is more than a corporate venture fund – it is a commitment to future generations. We are driven by the urgency of the challenges before us and the belief that, together, we can overcome them. The world needs breakthroughs—leaps—in health and agriculture. And through our work, we aim to make these leaps a reality, creating a healthier, more sustainable world for all.

Thank you for joining us on this journey.

Juergen Eckhardt
Head of Leaps by Bayer

we need to think and act differently."

Executive Summary

The Leaps by Bayer team is thrilled to present our inaugural Impact Report, reaffirming our commitment to investing in a brighter future. As impact investors, measuring the potential of our Leaps portfolio is a core priority.

In this report, we proudly share the initial results of our portfolio's impact evaluation, based on our custom framework, WALY (Wellbeing Adjusted Life Years), developed in collaboration with The Happiness Research Institute. Using a standardized checklist that captures the unique benefits of each innovation, we analyzed 25 Leaps portfolio companies to assess their potential impact.

WALY (Wellbeing Adjusted Life Years)

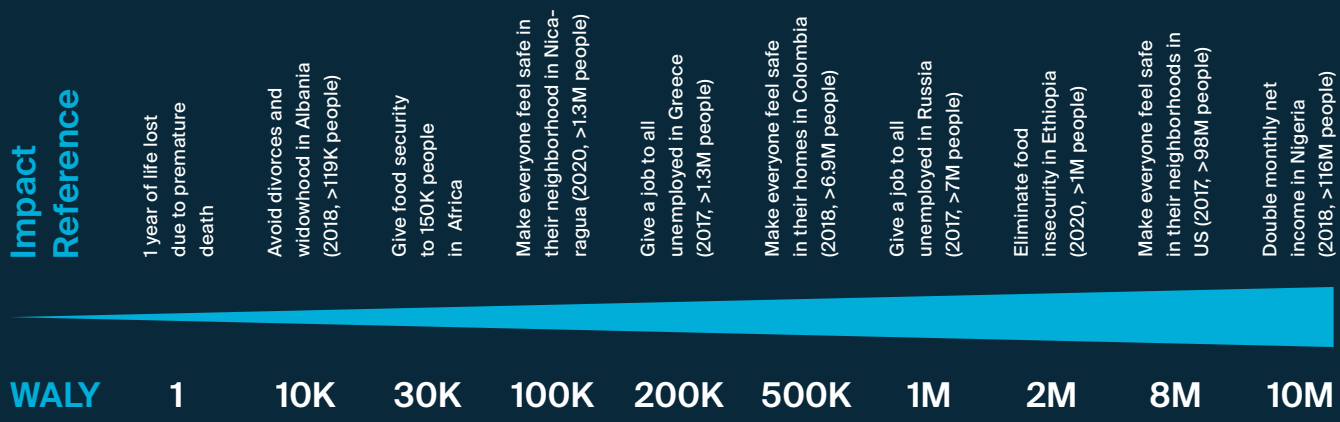
The Happiness Research Institute

Together, we aim to demonstrate the collective good we can achieve when we believe in and invest in innovation that advances humanity.

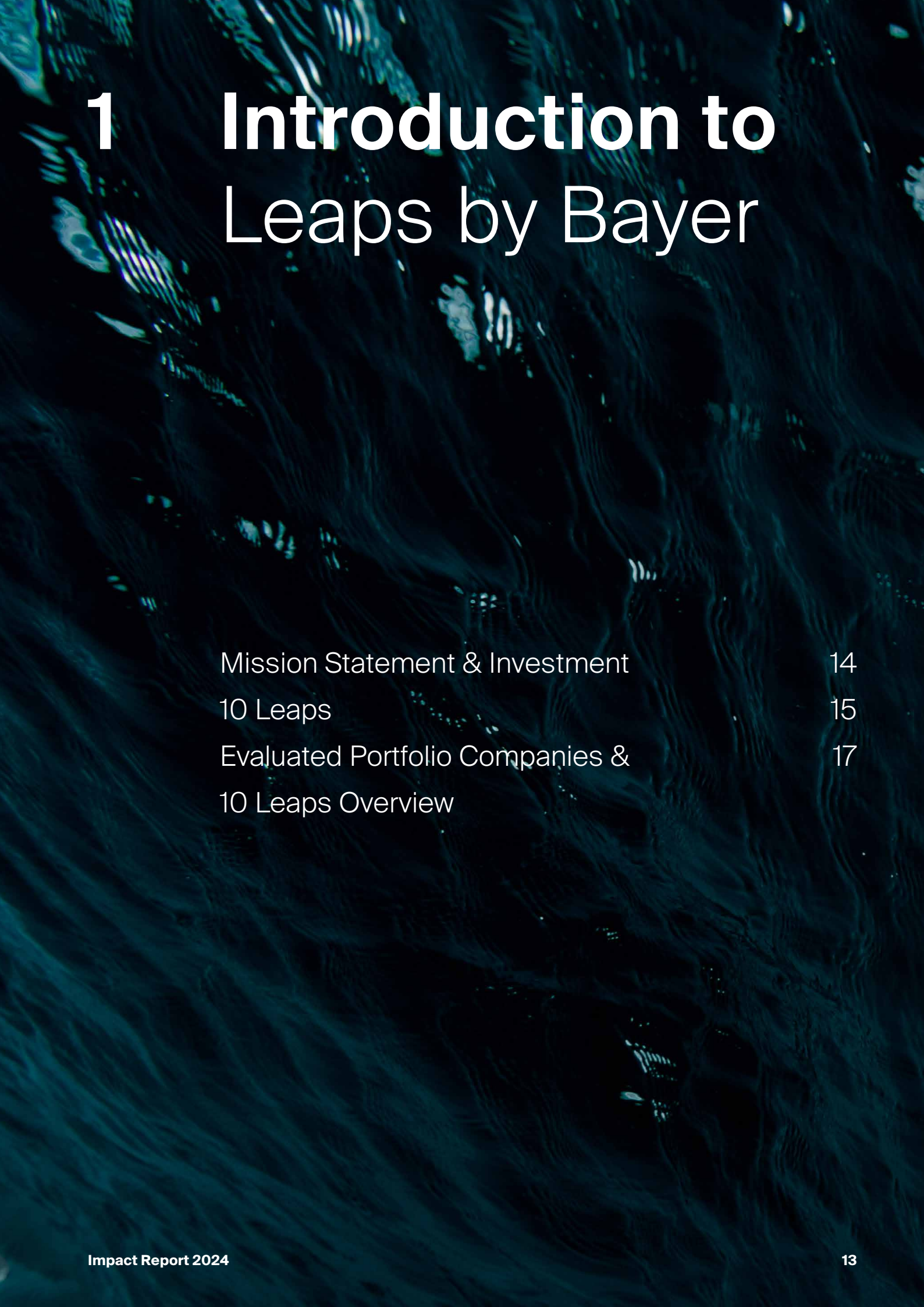
In 2034, our evaluated portfolio has the potential to achieve the following annual impact in the US:

KPIs	Units saved	WALYs saved
Health	**Improve the lives of >347 000 patients in the USA, broken down into:**	
	50 830 autoimmune disease patients	257 654
	7 951 genetic disease patients	90 835
	173 839 oncology patients	75 444
	114 550 other disease patients	285 426
	with an estimated total gain of 370 808 life years	
Ag		
GHG Emissions	Save 189 million tons CO_2 emissions equivalent to more than double the annual emissions of all cars in Spain[9]	1 919 557
Social Impact	Create 20 000 jobs	2 000
	Help bring 1.85 million people out of food insecurity	370 000
Local environment	Reduce 1.4 million tons of fertilizer	56 686
Productivity	Contribute 16 billion USD of net income	31 266
Water Use	Save 3 trillion liters of water equivalent to the daily water usage of over 15 billion people[10]	43 643
	Total WALYs saved	**3 132 511**

The WALY Equivalent Ruler



Leaps by Bayer aims to solve 10 of the world's biggest challenges through scientific breakthroughs.



1 Introduction to Leaps by Bayer

Mission Statement

Leaps by Bayer is Bayer's strategic impact investment unit. Founded in 2015, our mission is to invest in breakthrough technologies and disruptive business models that align with or are adjacent to Bayer's core businesses. By leveraging minority equity to both establish new ventures and invest in existing start-ups, we offer support to portfolio companies that extends beyond financial backing. With a focus on early-stage innovation within the life sciences across all Bayer divisions, Leaps aims to drive progress in two critical areas: advancing healthcare from treatment to cure and prevention, and improving agriculture by moving from more food production to better and more sustainable food.

Investment

Our investment framework is guided by our "10 Leaps" — ten huge challenges humanity is facing. The Leaps are the articulation of our goals, based on where our expertise as a company can make the biggest difference. With 1.9+ billion USD invested in 60+ companies since our founding in 2015, we aim to build, and accompany companies from creation until successful exit.

Companies invested	**60+**
Investment total	**1.9+ billion USD**

since 2015

10 Leaps. 10 Huge Challenges.

01 / **Cure** genetic diseases

HEALTH

Stopping genetic diseases before they develop or progress could prevent chronic suffering and give many of us the chance to live a full and healthy life.

02 / **Provide** sustainable organ and tissue replacement

HEALTH

Cell and gene therapies hold tremendous promise to restore health, reverse the course of degenerative diseases, and prevent organ failure.

03 / **Reduce** environmental impact of agriculture

AGRICULTURE

From carbon sequestration to reducing land and water usage, innovation has the power to transform modern agriculture.

04 / **Prevent** and cure cancer

HEALTH

Biotechnology that leverages the immune system and other emerging platforms could make huge strides in the fight against cancer.

05 / **Protect** brain and mind

HEALTH

Neurodevelopmental and neurodegenerative diseases along with mental health disorders represent a massive and growing unmet need with no simple solutions available.

06 / **Reverse** autoimmune diseases and chronic inflammation

HEALTH

Systematically addressing autoimmune diseases and chronic inflammation could enable lives free of pain, disease management, and life-threatening conditions.

07 / **Provide** next-generation healthy crops

AGRICULTURE

The Green Revolution lifted millions out of starvation, yet new approaches are needed to provide comprehensive nutrition at a global scale.

08 / **Develop** sustainable protein supply

AGRICULTURE

Nourishing a global population will require new approaches to sustain both a healthy planet and healthy people.

09 / **Prevent** crop and food loss

AGRICULTURE

A pandemic, climate volatility, and an increasingly long and complex supply chain expose the fragility of our global food system and the need for resilience.

10 / **Transform** health with data

HEALTH

From wearable devices to artificial intelligence and protein modeling – digital technology is sparking a revolution in medicine.

Evaluated Portfolio Companies
& 10 Leaps Overview

01 /
Cure
genetic diseases

02 /
Provide
sustainable organ and tissue replacement

03 /
Reduce
environmental impact of agriculture

04 /
Prevent
and cure cancer

05 /
Protect
brain and mind

06 /
Reverse
autoimmune diseases and chronic inflammation

07 /
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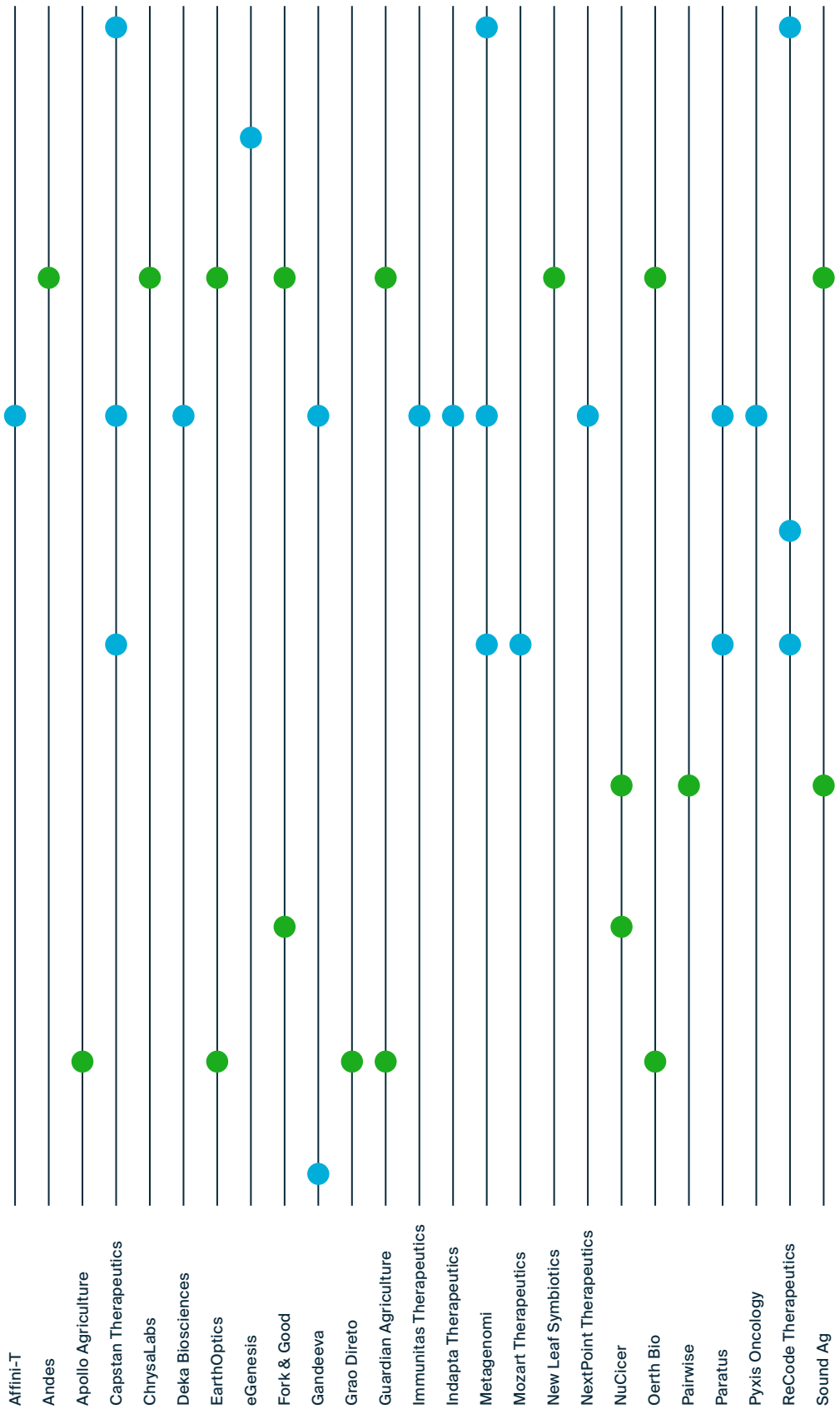

In an economy with limited resources, informed decision making is crucial. Introducing our data-driven impact unit: WALY (Wellbeing Adjusted Life Years).

2 Impact Measurement

The Need for Impact Measurement

“You can only change what you can measure.”

Economist Peter Drucker

What sets impact investments apart from other types of investing is their intentional focus on projects, funds, or companies that are expected to generate measurable positive social or environmental impacts alongside financial returns. Unlike traditional investing, which primarily aims to maximize profit, impact investors seek to create meaningful societal benefits in addition to financial gains.

A central aspect of impact investing is impact measurement and management (IMM), which ensures that investments truly deliver positive outcomes and avoid the risk of "impact washing." While other forms of investing may claim to have a social or environmental return (SER), impact investing distinguishes itself by making the measurement and demonstration of SER a core principle, ensuring that results are actively tracked and reported.

Impact measurement and management (IMM)

Measurement and demonstration of SER = core principle

WALY vs. ESG

In contrast, Environmental, Social, and Governance (ESG) metrics are not designed to measure the direct positive impact on society or the environment, but rather to assess how well a company manages its ESG risks and priorities. While impact is outward-looking, ESG is inward-looking and focuses on how a company operates. With the development of our custom measurement unit WALY (Wellbeing Adjusted Life Years), we quantify the impact of our investments, committing to report beyond a company’s ESG performance, and instead focus on a forward-looking assessment of a company’s full impact magnitude if the technology becomes successful.

ESG – Environmental, Social, and Governance

WALY – Wellbeing Adjusted Life Years

01 /
Cure
genetic diseases

02 /
Provide
sustainable organ and tissue replacement

03 /
Reduce
environmental impact of agriculture

04 /
Prevent
and cure cancer

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Develop
sustainable protein supply

09 /
Prevent
crop and food loss

10 /
Transform
health with data

The 10 Leaps & SDGs Overview

Over the years, the United Nations' Sustainable Development Goals (SDGs) have been increasingly used as a guiding framework for impact investors.

The SDGs include 17 goals that aim to protect the environment, tackle climate change, eliminate poverty, ensure a high quality of life for all, and are often adopted by investors to map their portfolio against a specific goal, reasoning their investments' positive contributions to society.

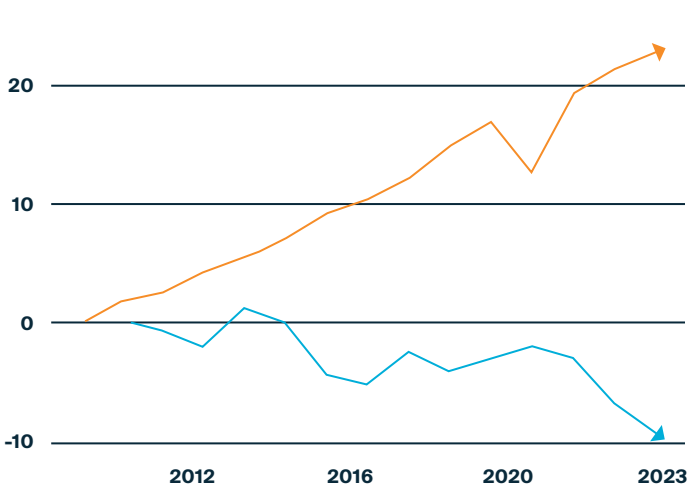
While the SDGs have been seen as a useful communication framework to articulate impact efforts to various stakeholder groups internally and externally, they have also faced criticism that they do not quantify impact outcomes and therefore do not fulfill the needs of an impact measurement tool that can aide in the process of assessing a company's impact achievements or ambitions.

Despite these limitations, we recognize the value of a common language among impact investors and have mapped our "10 Leaps" against the SDGs as well.

Our Impact Metric – WALY

In recent years, the world has changed dramatically. Traditional measures of progress no longer reflect how well people are truly living. Since 2009, the US GDP has grown by 22%, yet overall wellbeing has declined by 9%. This disconnect is becoming more common across many countries, where technological advances and economic growth continue, however wellbeing feels increasingly out of reach.

GDP per capita and life satisfaction in the USA



+22%

GDP per capita 2023

–9%

Life satisfaction 2023

Visualization by author. Data points taken from the World Happiness Report 2024

In an economy with limited resources, making informed decisions is crucial. We need measures that enable us to understand which will have a greater long-term impact on the wellbeing of the population. Until now, it has been nearly impossible to comparatively discuss the societal benefits across multiple outcome domains (e.g., human health improvements, environmental health improvements, emissions/water conservation, or economic revitalization).

Leaps recognized some time ago that, in order to evaluate the impact a new technology can have on the population, it was necessary to develop a metric beyond conventional ones—one that goes beyond ESG and SDG considerations and allows us to understand how many people will benefit from contributions like reducing CO_2 emissions, curing a disease, or eliminating unemployment. That's why, in collaboration with the Happiness Research Institute, we introduced **Wellbeing Adjusted Life Years (WALY).** This human-centered, data-driven metric helps us determine the impact of events on wellbeing and predict how much good we can achieve by addressing global challenges such as disease, climate change, and social inequality.

Wellbeing Adjusted Life Years (WALY)

WALY is a measure of time weighted by wellbeing

WALYs allow for comparison of life satisfaction between affected and non-affected people.

1 WALY relates to = 1 year lived in the same wellbeing as if not affected.

To calculate WALYs, a large number of people are asked to report on their own experienced quality of life and their circumstances.

The severity of diseases or environmental impacts are then measured in terms of people's/patients' experience on a scale from 0 (lowest wellbeing) to 1 (highest wellbeing).

Treatments and technologies can then be assessed in terms of their effects on people life satisfaction.

How satisfied are you with your life?

Wellbeing

0 **Completely dissatisfied** — **Completely satisfied** 1

The WALY Formula

When calculating WALYs we make use of the following formula:

$$\text{WALYs}^{(\text{lost})} = 1 - \frac{\text{actual life satisfaction}}{\text{potential life satisfaction}}$$

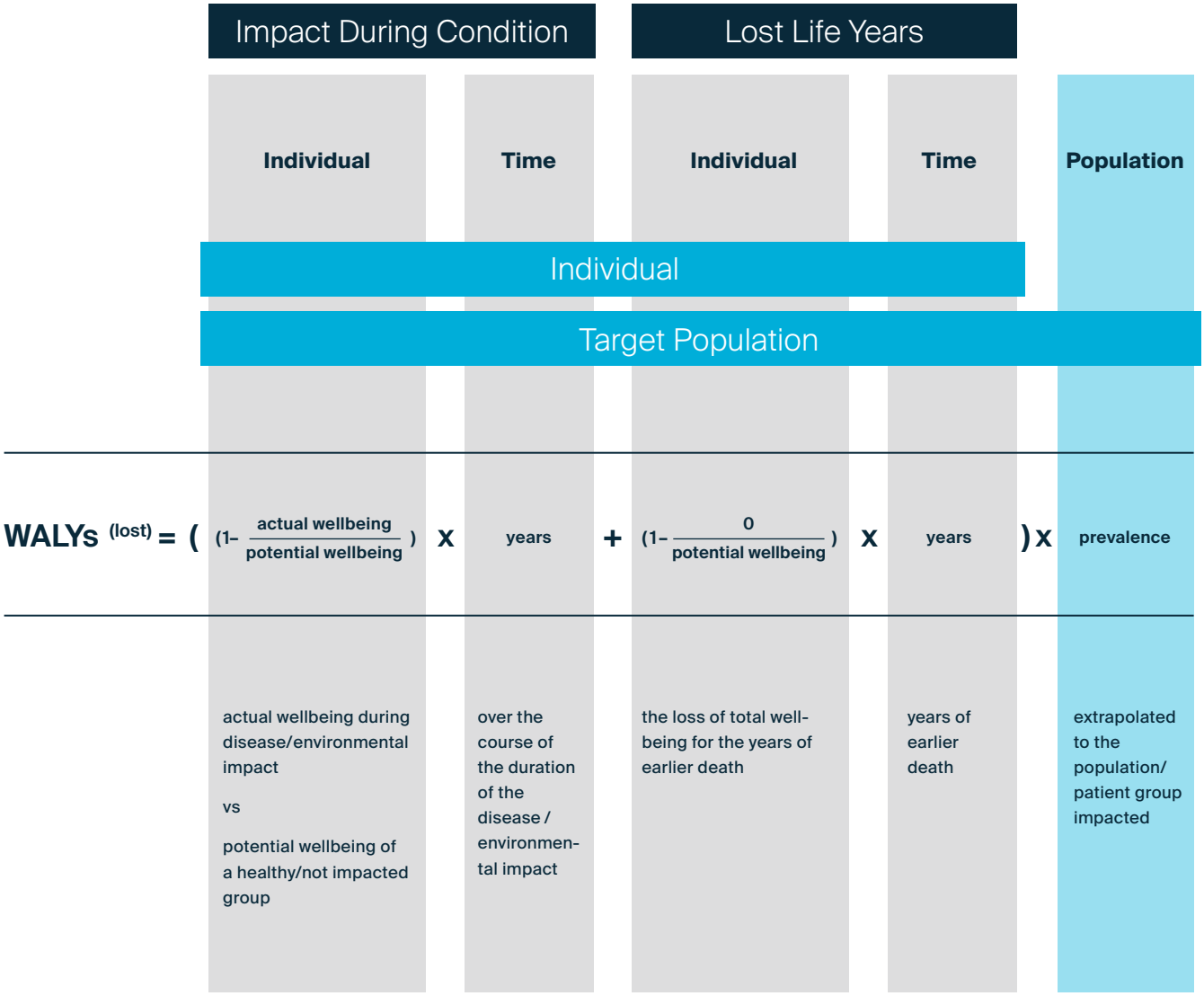
“Actual life satisfaction” refers to the average life satisfaction of the target group (e.g., cancer patients or the farmers exposed to the consequences of a drought) and “potential life satisfaction” refers to the level of wellbeing these people would experience in the absence of the respective condition.

How to calculate WALYs – a simplified guide

When we consider the impact in terms of WALYs, any impact is expressed as a decimal number ranging from 0 to 1. For example, if a patient loses 0.04 WALYs to a condition—such as asthma—she can be said to lose 4% of the wellbeing she could have otherwise experienced as a healthy individual.

Additionally, these individual losses can be aggregated to reflect “societal values” by multiplying the individual WALY impact value by prevalence and then by adding mortality rates.

Wellbeing Adjusted Life Years (WALYs)



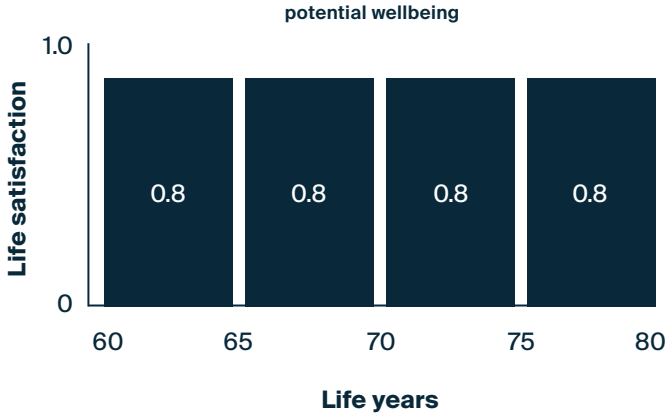
Sample Calculation Health

For a sample patient, the WALY calculation would proceed as follows: The comparable healthy population aged 60-80 has a life satisfaction score of 0.8, influenced by natural aging factors such as increased back and joint pain. At age 65, patient is diagnosed with a disease, reducing their life satisfaction from 0.8 to 0.7. The patient lives with the disease for 10 years until passing away at age 75, five years earlier than their healthy counterparts.

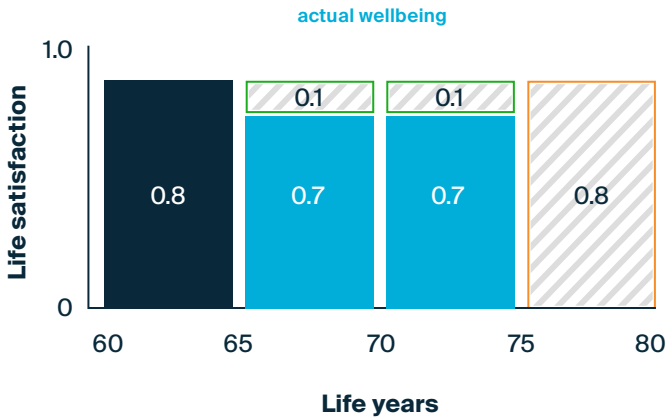
When calculating WALYs, we consider both the reduction in life satisfaction during the course of the disease and the additional loss in wellbeing due to premature death. These factors are combined to determine the total WALYs lost per patient. By multiplying this figure by the prevalence of the disease, we can assess the total WALYs lost across the affected population.

Conversely, calculating the WALYs lost allows us to estimate the WALYs a portfolio company could save, for instance, by developing a cure for sample disease.

Comparable healthy population



Patient suffering from disease from year 65 to 75 and dying 5 years earlier



impact during condition	$(1 - \frac{0.7}{0.8})$	x	10 years (65 to 75)	
	+			
lost life years	$(1 - \frac{0}{0.8})$	x	5 years (75 to 80)	

$$\text{WALYs}^{(\text{lost})}_{\text{indiv.}} = \begin{matrix}(0.125) \times 10 \\ + \\ (1) \times 5\end{matrix} = 6.25 \text{ per individual}$$

$$\text{WALYs}^{(\text{lost})}_{\text{pop.}} = 6.25 \times 50\,000 \text{ patients} = 312\,500 \text{ for target population}$$

Sample Calculation Agriculture

When applying the WALY methodology to the agricultural sector, many of the previously discussed key principles remain applicable, with additional factors to consider. Calculating WALYs for the agricultural industry are based on six predefined impact KPIs, detailed in Chapter 4.

Below is a fictional sample calculation for one of these KPIs:
Social Impact - Employment

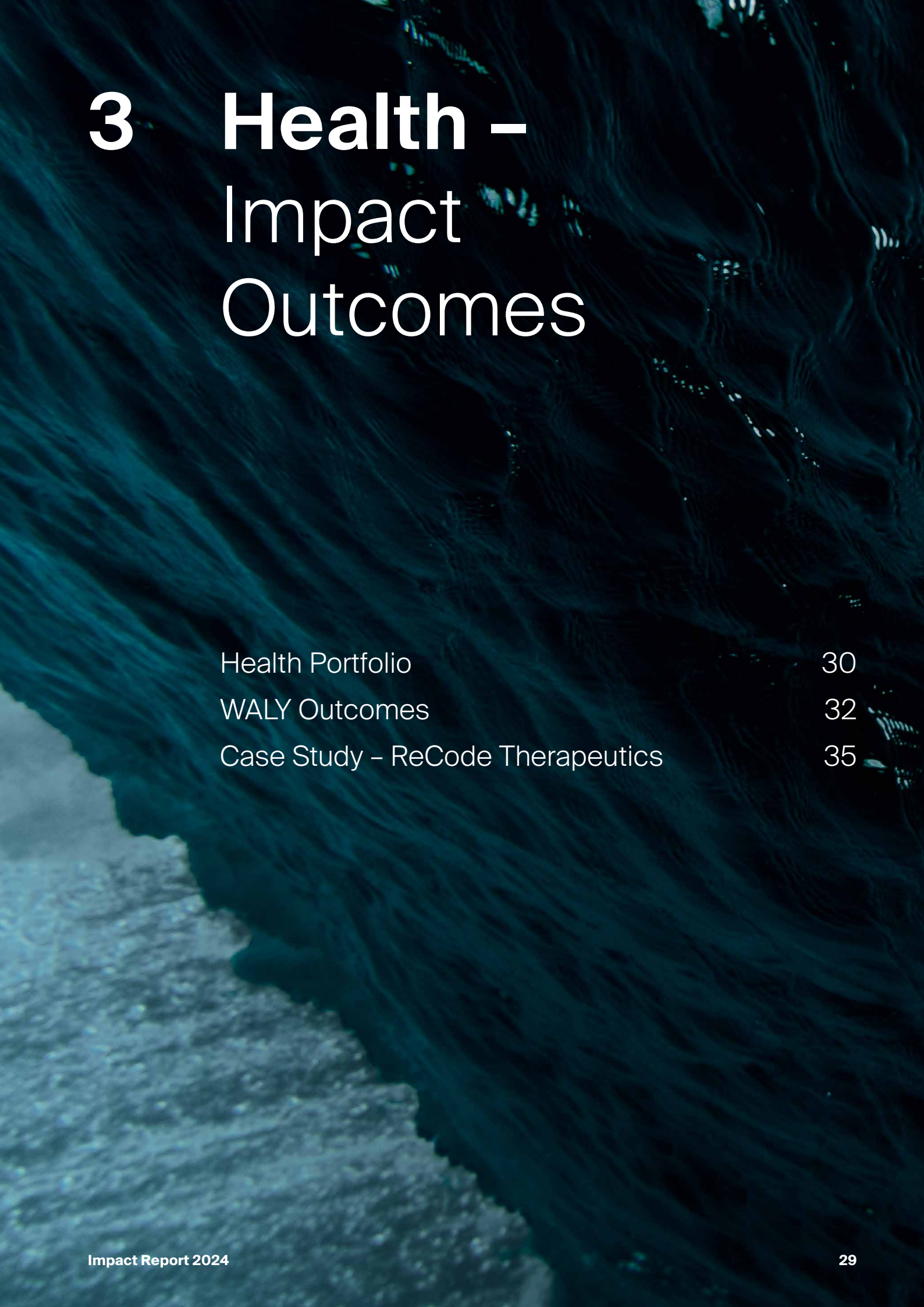
In this example an unemployed individual aged 20-30 assumingly has a life satisfaction score of 0.7, influenced by factors such as financial strain, social isolation, and limited access to healthcare. In contrast, the employed group scores at a life satisfaction of 0.8. Using the WALY formula, individuals affected by unemployment lose 0.125 annual WALYs (calculated as 1 - 0.7/0.8), which, when multiplied by 10 years of unemployment, results in a total loss of 1.25 WALYs. These individual losses can then be extrapolated to the broader unemployed population by multiplying the lost WALYs per individual (1.25) by the population size.

Conversely, calculating the WALYs lost allows us to estimate how many WALYs a portfolio company could save by, for example, developing agricultural technologies that create new jobs. In economically disadvantaged regions, such technologies can lift individuals out of unemployment and social isolation, providing economic stability, enhancing food security, and ultimately improving the quality of life for individuals and their families.

$$\text{WALYs}^{(\text{lost})} = (1 - \frac{0.7}{0.8}) \times 10 \text{ years (20 to 30)} = 1.25 \text{ per individual}$$

From treatment to cure

Together with our portfolio companies, we pursue paradigm-shifting breakthroughs, leveraging emerging technologies to achieve the seemingly impossible.



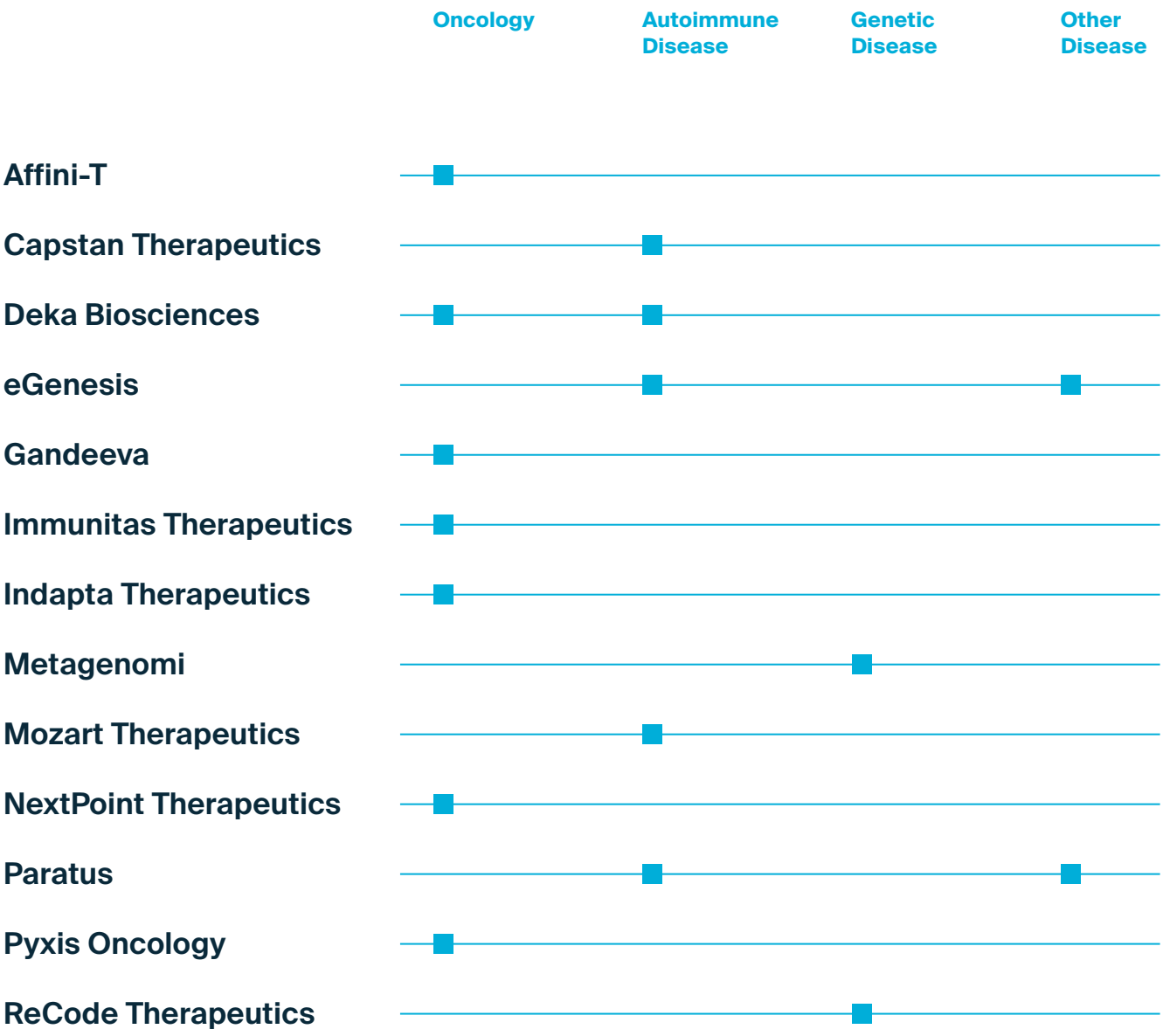
3 Health – Impact Outcomes

Health
Portfolio

Our health portfolio ranges from innovations in treating genetic diseases, curing cancer, combating organ shortages, to reversing autoimmune diseases.

With innovations based on CAR-T cell therapy, stem cell biology, gene editing, mRNA technology, artificial intelligence, and digital health, we seek to find new solutions to advancing healthcare from treatment to cure and prevention.

Overview of evaluated portfolio by therapeutic areas



Overview based on the indications/technologies included in impact evaluation exercise.
Not comprehensive to overall pipeline/future potential.

WALY
Outcomes

To calculate the WALYs our Leaps portfolio could generate, we requested that all our portfolio companies participate in an impact assessment. They were asked to complete a standardized spreadsheet providing insights into their targeted indications, projected patient population, curative potential and symptom alleviation, and life extension estimations. Based on the answers provided by the evaluated companies we were able to calculate the WALY potential for our so-called "targeted population" and "scaled population".

Impact assessment

In order to ensure comparability, the targeted population assesses the impact potential our portfolio in one chosen geography – the US. The scaled population – helps us to think big: here we do not only consider the impact our portfolio generates in the US but instead assess the impact our portfolio could have if all technologies are active in the 7 major markets (EU4 + UK, Japan, and USA), achieved full market share, and maximum access to all affected patients.

Targeted population

Scaled population

Health Outcomes

Targeted Population

In 2034, our evaluated health portfolio has the potential to achieve the following annual impact in the US:

Improve the lives of >347 000 patients in the USA, broken down into:

Units saved	WALYs saved
50 830 autoimmune disease patients	257 654
7 951 genetic disease patients	90 835
173 839 oncology patients	75 444
114 550 other disease patients	285 426
with an estimated total gain of 370 808 life years	
Total WALYs saved	**709 359**

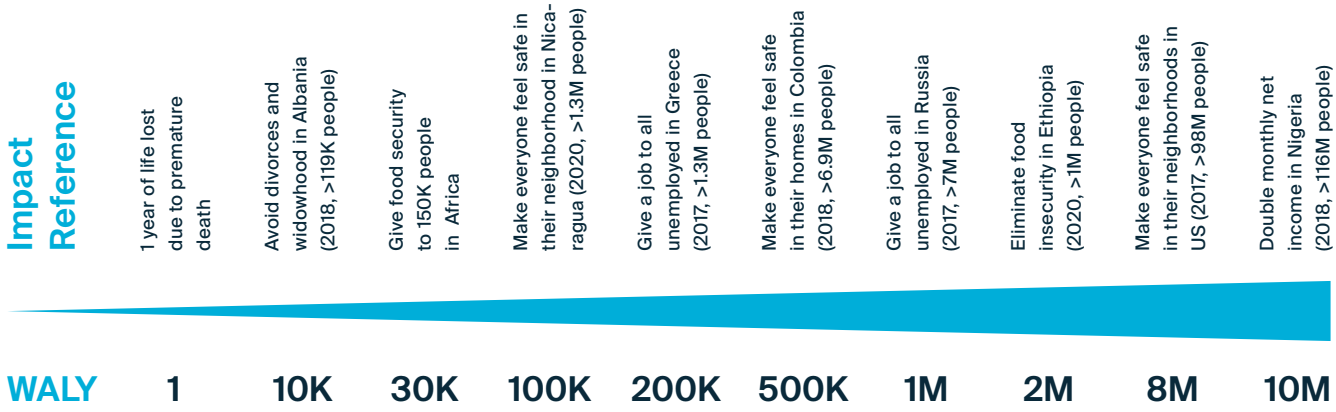
Scaled Population

Assuming full market share, our evaluated health portfolio has the potential to achieve the following annual impact in our 7 major markets:

Improve the lives of >27 million patients in the 7 major markets, broken down into:

Units saved	WALYs saved
11.9 million autoimmune disease patients	46 996 094
61 606 genetic disease patients	776 461
13.3 million oncology patients	5 583 060
2.7 million other disease patients	5 091 244
with an estimated total gain of 10.6 million life years	
Total WALYs saved	**58 446 859**

The WALY Equivalent Ruler



To illustrate how we calculate WALY for our portfolio companies, we present a case study from the Leaps Health portfolio:

ReCode Therapeutics

This example showcases WALY calculations and the associated impact potential across the company's full product pipeline, which typically includes more than one indication.

All portfolio companies participating in our WALY assessment were encouraged to think ambitiously, recognizing that early-stage innovations involve continuous technology refinements and evolving data points. The calculations reflect the wellbeing potential each company could achieve in Year 5 after launching their first product, assuming technological success.

Case Study – ReCode Therapeutics

Powering the next wave of genetic medicines with precision delivery

“By targeting the underlying genetic causes of disease with its novel technology, ReCode is shaping a world where patients with few or no treatment options — such as those living with genetic diseases — have a path to curative therapies.”

ReCode Therapeutics is pioneering a new era in genetic medicine with its Selective Organ Targeting (SORT) lipid nanoparticle (LNP) platform. This groundbreaking technology enables precise delivery of genetic medicine—such as mRNA and gene correction therapies—to organs beyond the liver, unlocking the full potential of precision medicine. This approach holds particular promise for patients with genetic diseases like cystic fibrosis and primary ciliary dyskinesia, where there are limited or no treatment options today.

By developing a broad, customizable, and non-viral platform, ReCode aims to deliver life-changing therapies to address unmet medical needs. Their ability to target specific organs allows for unprecedented precision and versatility in developing drug candidates, offering new hope for patients with life-limiting respiratory and genetic disorders.

ReCode's Selective Organ Targeting (SORT) lipid nanoparticle (LNP) platform

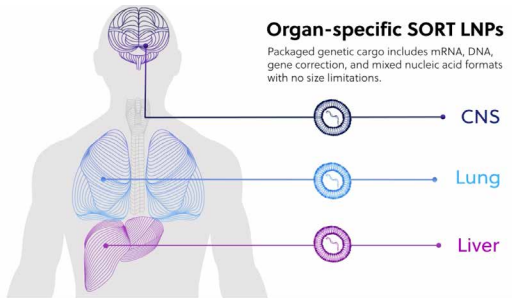
ReCode's SORT LNP platform surpasses the traditional LNP delivery systems used in mRNA vaccines, targeting specific organs and tissues with optimal modes of administration.

Innovations in healthcare often target more than one indication. ReCode's current pipeline focuses on two key indications:

Cystic Fibrosis

Primary Ciliary Dyskinesia (PCD) DNAi1

Both conditions are rare genetic disorders that impact the respiratory system. With anticipated launches in 2027, our WALY assessment examined the potential impact of ReCode's technology in 2032 — five years post-launch.



The following WALYs highlight ReCode's projected impact in 2032, showcasing annual results:

			US		7 major markets	
	Curative Potential	**Individual WALY[A]**	**Target[B] Patients** year 5 after 1st launch	**WALYs Target[B]**	**Scaled[C] Patients** 7MM prevalence	**WALYs Scaled[C]**
Cystic fibrosis	70%	11.3 [0.20 WALY x 31 y] [1 WALY x 10 y]	3.5 k	39.7 k	17.9 k	202.7 k
Primary ciliary dyskinesia (PCD) DNAi1	70%	11.0 [0.07 WALY x 82 y] [1 WALY x 10 y]	1.5 k	16.5 k	11.9 k	131.0 k

Total net benefit of **56 200 WALYs** in the US

[A] Individual WALY: [WALYs gained from alleviating symptoms, for # of years patient would have otherwise lived with the disease] + [WALYs gained from avoiding death, for # of years patient would have otherwise prematurely died], additionally adjusted for the technology's curative potential.

[B] Target patient number: intended USA market share in 2032 (year 5 from the first launch date in 2027).

[C] Scaled patient number: prevalence of the indication(s) across 7 major markets (France, Germany, Italy, Spain, UK, USA, & Japan).

Key Projected Patient Numbers
in the US 2032

3 500
patients

Cystic fibrosis

1 500
patients

Primary ciliary dyskinesia (PCD) DNAi1

Cystic Fibrosis (CF)

Cystic Fibrosis (CF) is a **genetic disorder** that causes the production of thick, sticky mucus, **leading to chronic respiratory infections, digestive problems, and other systemic complications.** Current treatment options for CF focus on managing symptoms, preventing complications, and improving quality of life, as there is no cure.

The **protein Cystic Fibrosis Transmembrane Conductance Regulator (CFTR)** plays a crucial role in the Cystic Fibrosis disease picture. It is a protein that functions as a channel for chloride ions across cell membranes, **playing a crucial role in regulating the movement of salt and water in tissues.**
Mutations in the CFTR gene cause the defective chloride transport seen in Cystic Fibrosis (CF), leading to thick, sticky mucus production in the lungs, pancreas, and other organs.

ReCode's therapy is designed to target the root cause of CF by **delivering CFTR mRNA directly to the lungs, striving to restore CFTR protein function**, aiming to benefit more people living with CF with a curative potential of 70%. The individual WALYs were calculated by firstly adding the WALYs gained from alleviating symptoms for number of years patient would have otherwise lived with the disease (0.20 WALY x 31 years), secondly adding the WALYs gained from avoiding death for the number of years patient would have otherwise prematurely died with no treatment option (1 WALY x 10 years), and lastly adjusted for the technology's curative potential of 70% — resulting in an annual gain of 11.3 WALYs per individual. When multiplying the individual WALYs gained by ReCode's intended target USA market share in 2032, which is equivalent to 3 500 patients treated with ReCode's genetic therapy, the target population WALY outcomes lie at **39 700 WALYs saved through ReCode's CF therapy, which is equivalent to giving a job to all unemployed in Czechia for one year.**

Primary ciliary dyskinesia (PCD)

PCD is a **rare genetic disorder characterized by defective cilia function**, leading to impaired mucus clearance in the respiratory tract, chronic respiratory infections, and potential issues in other organ systems. Cilia are tiny, hair-like structures that help keep the airways, ears, and other parts of the body functioning. When these cilia can't move properly, it leads to **chronic respiratory infections, ear infections, and even fertility issues.**

Current treatment options for PCD focus on managing symptoms, preventing complications, and improving quality of life, as there is no cure for the condition. Treatments are aimed at maintaining lung function, preventing respiratory infections, and addressing related health issues.

ReCode's new investigational **mRNA-based therapeutic targets PCD caused by mutations in the DNAI1 gene.** This gene is crucial for ciliary movement. By delivering it as an inhaled therapy, ReCode aims to restore ciliary function in the lungs of affected individuals, **addressing the root cause of PCD rather than merely managing symptoms.**

The individual WALYs were calculated by firstly adding the WALYs gained from alleviating symptoms for number of years patient would have otherwise lived with the disease (0.07 WALY x 82 years), secondly adding the WALYs gained from avoiding death for the number of years patient would have otherwise prematurely died with no treatment option (1 WALY x 10 years), and lastly adjusted for the technology's curative potential of 70% — resulting in an annual gain of 11 WALYs per individual. When multiplying the individual WALYs gained by ReCode's intended target USA market share in 2032, which is equivalent to 1 500 patients treated with ReCode's genetic therapy, the target population WALY outcomes lie at **16 500 WALYs saved through ReCode's PCD therapy, which is equivalent to doubling the monthly net income of the Islandics for one year.**

Total Targeted Population
Wellbeing Impact

In total, ReCode's technology development for CF and PCD patients will generate a **56 215 WALYs in 2032 for ReCode's US target audience, which is comparable to eliminating food insecurity in Puerto Rico for one year**. This substantial impact reflects ReCode's ability to immensely improve patient outcomes and improve human wellbeing over time.

Total Scaled Population
Wellbeing Impact

When taking a next visionary step and assuming full market share and prevalence reach for ReCode's technology in the 7 MM: Japan, US, and EU4 + UK markets (Germany, Spain, Italy, France, and UK), the scaled patient sizes for both indications would expand to 11 900 PCD patients and 17 900 CF patients, leading to 131 000 WALYs saved in PCD and 202 700 WALYs saved for CF, resulting in a total of **333 700 WALYs saved which is equivalent to making everyone feel safe in their homes in Ethiopia for one year.**

From more to better

Our portfolio companies are driving innovations that aim to reduce the intensive use of chemicals, land, and water in farming, while enhancing productivity, nutrition, and quality.

4 Agriculture – Impact Outcomes

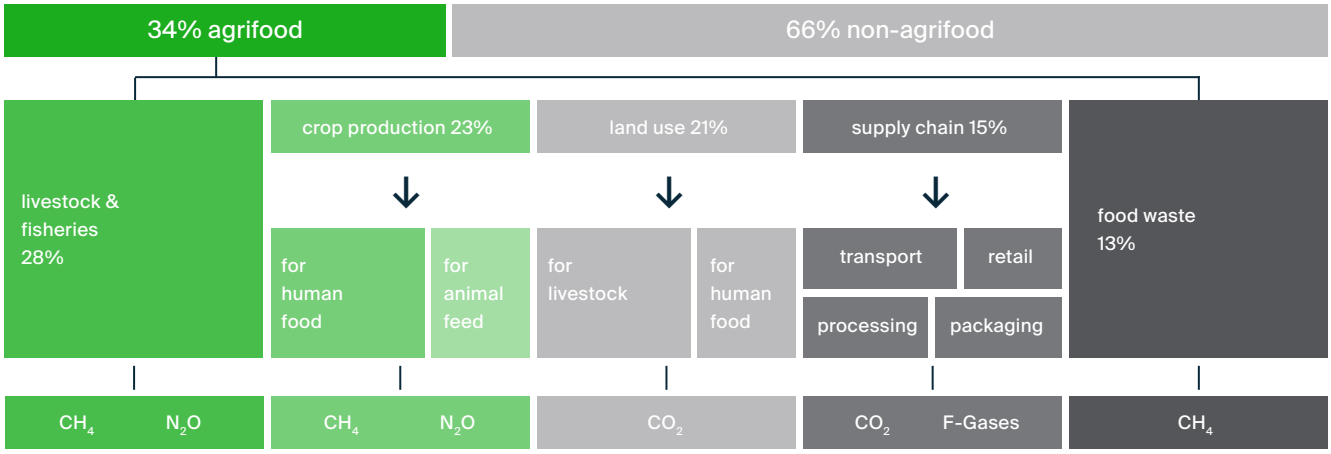
Agriculture
Portfolio

Our agriculture portfolio ranges from reducing the environmental impact of agriculture, preventing crop loss, improving soil health, to creating sustainable protein supply.

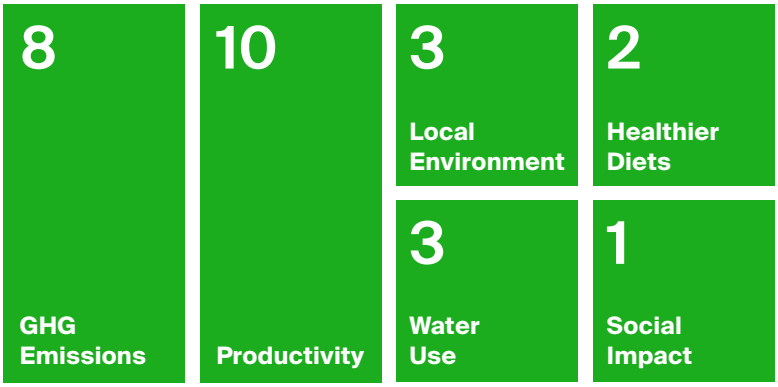
With technologies leveraging CRISPR, nitrogen fixation, carbon capture, artificial intelligence, and digital platforms, we support precision agriculture and regenerative approaches, moving from conventional agricultural practices of more food production to better and more sustainable food.

Breakdown of GHG emissions for the agrifood sector

Source: Crippa et al. (2021)



Overview of evaluated portfolio by KPIs



Overview based on the indications/technologies included in impact evaluation exercise.
Not comprehensive to overall pipeline/future potential.

Impact KPIs
Deep Dive

Innovations in agriculture impact society on multiple levels. For each of the latter named KPIs, we have developed a data-backed methodology to translate the benefits into WALYS.

GHG Emissions

Many new technologies, such as nitrogen fixation and carbon capture, help reduce greenhouse gas emissions, mitigating global warming and its consequences, like heat waves, floods, and droughts. The Happiness Research Institute has developed a method to assess the long-term impact of GHG reduction on climate change over the next 100 years. This approach takes into account factors such as deaths, economic losses, and the number of people affected by climate-related environmental disasters. Drawing on that data, the Institute has estimated how many of these disasters could be prevented through emission reductions.

Local Environment

Precision farming technologies use data on weather, soil moisture, and crop health to optimize the timing and application of inputs like fertilizers. This prevents wasteful use during periods of poor uptake, such as before heavy rains or in already saturated soils, thereby reducing groundwater contamination and air pollution and its associated environmental damage.

Productivity

Drones and other precision farming tools enhance agricultural productivity by improving efficiency, optimizing crop management, and reducing resource waste. These targeted technologies lead to greater productivity and cost savings compared to traditional methods.
The Happiness Research Institute has developed a method to quantify the impact of these economic benefits on population wellbeing. By conducting surveys with thousands of people, the Institute has established a link between reported life satisfaction and income levels, enabling it to measure how much an individual's quality of life improves as a result of the economic gains generated.

Water Use

Other innovations aim to decrease water usage in farming, freeing up water for other societal needs. Reducing water demand in agriculture could lead to numerous benefits. Lowering agricultural water demand could, for example, make drier lands, which currently lack the necessary conditions for healthy crop growth, more suitable for farming in the future. The Happiness Research Institute has studied the severity of droughts affecting populations in the United States, Japan, and Europe, along with surveys measuring the difference in life satisfaction between farmers impacted by droughts and those with sufficient water supply. Using this data, the Institute has calculated the overall impact of droughts on populations and, more importantly, the increase in well-being that could result from crop technologies that require less water use.

Social Impact

In economically disadvantaged regions, agricultural technologies can create new jobs and enhance food security, improving the quality of life for individuals and their families through better living conditions. According to the Happiness Research Institute's analysis, drawing on data from the World Values Survey, individuals facing food insecurity in Africa report 20% lower life satisfaction compared to those without such challenges.

Healthier Diets

By improving the nutrient score and taste of fruits and vegetables and developing alternative protein sources that reduce the reliance on red meat, such innovations can enable healthier diets.

WALY Input Factors

Agriculture
based on current Leaps portfolio

WALY
Outcomes

Impact assessment

To calculate the WALYs our Leaps portfolio could generate, we requested that all our portfolio companies participate in an impact assessment. They were asked to complete a standardized spreadsheet detailing their projected reductions in fertilizer and water use, improvements in environmental resilience, increases in productivity, GHG impacts, and more. Based on the answers provided by the evaluated companies we were able to calculate the WALY potential for our so-called "targeted population" and "scaled population".

Targeted population

Scaled population

In order to ensure comparability, the targeted population assesses the impact potential our portfolio has in one chosen geography – the US. The scaled population – helps us to think big: here we do not only consider the impact our portfolio generates in the US but instead assess the impact our portfolio could have if all technologies are active in the 7 major markets (EU4 + UK, Japan, and USA) and achieved full market share.

Ag Outcomes

Targeted Population

In 2034, our evaluated agriculture portfolio has the potential to achieve the following annual impact in the US:

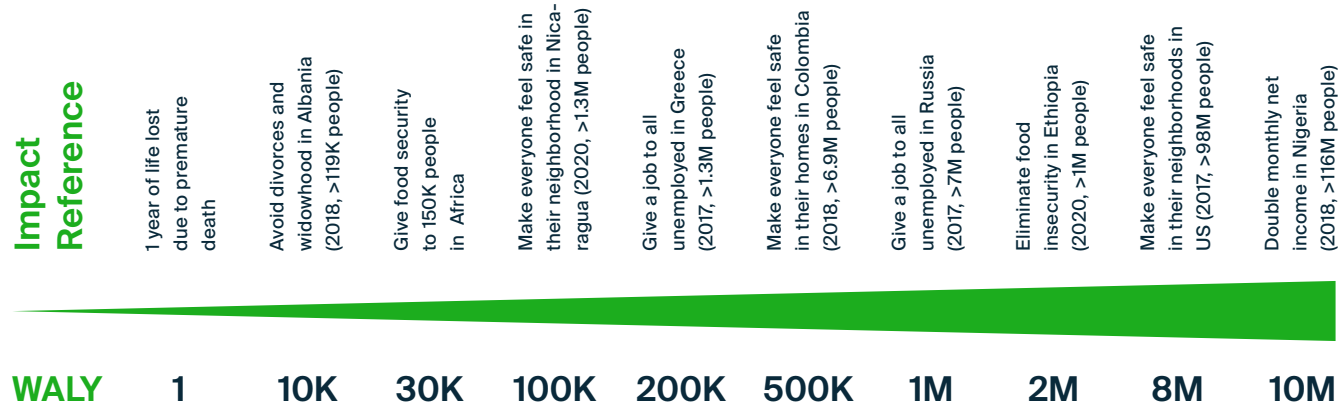
KPIs	Units saved	WALYs saved
GHG Emissions	Save 189 million tons CO_2 emissions equivalent to more than double the annual emissions of all cars in Spain[11]	**1 919 557**
Social Impact	Create 20 000 jobs Help bring 1.85 million people out of food insecurity	**2 000** **370 000**
Local Environment	Reduce 1.4 million tons of fertilizer	**56 686**
Productivity	Contribute 16 billion USD of net income	**31 266**
Water Use	Save 3 trillion liters of water equivalent to the daily water usage of over 15 billion people[12]	**43 643**
	Total WALYs saved	**2 423 152**

Scaled Population

Assuming full market share, our evaluated agriculture portfolio has the potential to achieve the following annual impact in our 7 major markets:

KPIs	Units saved	WALYs saved
GHG Emissions	Save 1.4 billion tons of CO_2 emissions Equivalent to double the annual emissions of Germany[13]	**14 054 257**
Social Impact	Create 100 000 jobs Help bring 8.4 million people out of food insecurity	**9 100** **1 684 944**
Local Environment	Reduce 13 million tons of fertilizer	**569 222**
Productivity	Contribute 124 million USD of net income	**195 615**
Water Use	Save 603 trillion liters of water equivalent to the daily water usage of the entire global population for 1 year (assuming each person uses an average of 200 liters of water)[14]	**2 173 547**
	Total WALYs saved	**17 001 741**

The WALY Equivalent Ruler



To illustrate how WALY is calculated for our portfolio companies, we present two case studies from the Leaps Agriculture portfolio:

Oerth Bio and Apollo Agriculture

These examples showcase WALY calculations and their associated impact potential. All portfolio companies were encouraged to think visionary during the WALY exercise, recognizing that early innovations often involve ongoing technology refinements and fluctuating data points. The calculations reflect the wellbeing potential each company could achieve in Year 5 after the launch of their first product, if the technology succeeds.

Case Study – Oerth Bio

Protecting and improving plant health with protein degraders

“By harnessing protein degraders, Oerth Bio is improving the resilience and quality of the global food system while minimizing environmental impact.”

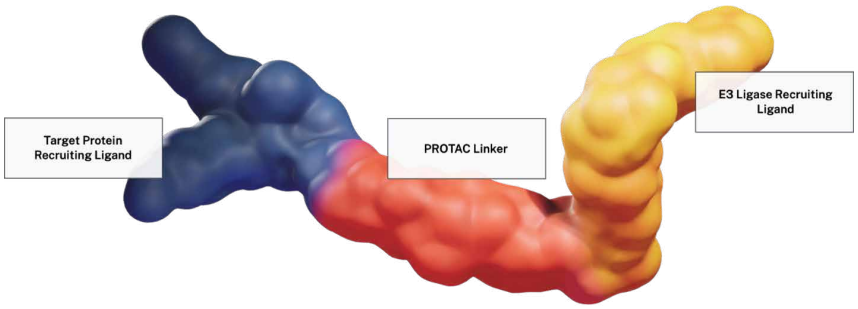
It has been 40 to 50 years since the last breakthrough in crop protection, and a fundamental shift in agricultural chemical development is urgently needed — for our human and planet health. Oerth Bio™ is at the forefront of this change, leveraging its patented PROTAC® (PROteolysis TArgeting Chimera) protein degradation technology to transform the future of farming.

Originally developed to combat human diseases such as cancer, PROTAC® now provides an innovative pathway to entirely novel crop protection and climate-resilient solutions. By building on Arvinas’ leadership in targeted protein degradation since 2013 and Bayer’s expertise in human therapies and sustainable agriculture, Oerth Bio is ushering in a new era of plant health and crop protection. Oerth Bio is the first and only company applying this groundbreaking technology to agriculture.

PROTAC® technology offers powerful efficacy with next-generation environmental sustainability, delivering unparalleled food and feed safety, superior field performance, and climate-resilient solutions for farmers. Oerth’s targeted protein degraders enable high-precision product development, low application rates, and the ability to overcome biological resistance. Designed to interact with only one target protein, Oerth’s molecules safeguard off-target and beneficial organisms, offering a sustainable and highly effective path to novel crop protection products.

PROTAC® molecules take advantage of the natural protein degradation pathway in target species, selectively disrupting metabolic processes in weeds, pathogens, or insects. Oerth Bio is also exploring novel applications in crop efficiency and plant resilience, maximizing the potential of PROTAC® technology for the benefit of farmers and the global food system.

What is a PROTAC Molecule?



Innovations in agriculture often impact society on multiple levels. Oerth Bio's PROTAC® technology is projected to achieve the following benefits:

Reduced water use
Decreased GHG emissions, particularly CO_2
Increased revenue for farmers

Oerth Bio has projected different launch dates for PROTAC® technology in various applications:

Plant resilience	2030
Insect control	2033
Water use efficiency	2034
Disease and weed control	2035

With a target coverage of 34.6 million acres in year 5 after launch in US, Oerth Bio expects to achieve the following results:

Key Projected Outcomes
in the US 2035

2 Trillion Liters of Water Savings

Oerth Bio expects to save 500 000 liters of water per acre, leading to a total savings of 2 trillion liters.

445 Million kg of CO_2 Emission Reduction

With an expected reduction of 13.8 kg of CO_2 per acre, Oerth Bio aims to reduce 445 million kilograms of CO_2 emissions.

2.3 Billion USD Revenue Increase

Oerth forecasts an increase of 64.8 USD per acre, contributing to a 2.3 billion USD boost in revenue for farmers.

With the first product launch expected in 2030 for plant resilience, the WALY calculation focuses on Oerth's company impact reached five years after the first product launch.

The following WALYs highlight Oerth Bio's projected impact in 2035, showcasing annual results:

	US		7 major markets	
	Target Population Value Year 5 after launch[A,B]	**Targeted Population WALYs[A,B]**	**Scaled Population (per year)[C]**	**Scaled Population WALYs[C]**
Production	34.6 M acres		916.8 M acres	
Water Use	2 T L	25.2 k	464 T L	800.7 k
GHG Emissions	445 M kg of CO_2	4.5 k	13 B kg of CO_2	130.2 k
Productivity	$2.3 B per year	1.5 k	$59 B per year	50.3 k

Total annual target population benefit of **30 200 WALYs** in the USA in year 5 after launch

[A] Launch year = 2030. Launch+5 = 2035. Production was provided from 5 different products and they all probably overlap. The aggregated production on the 5 products may be misleading.

[B] Target population geography: USA

[C] Assuming Oerth could supply all the farms in the EU4 + UK, USA, and Japan.

Water Use

An acre of US corn needs on average ~650 000 gallons of water per year[15,16], which converts to ~2.5M liters per acre. In an ideal case, Oerth estimates that its water efficiency product could reduce water requirements by ~20%, saving up to **500 000 liters of water per acre**. When extrapolating the water reduction to Oerth's US target population, this would amount to a total savings of **2 trillion liters of water**. Using the earlier described drought model, the HRI has calculated the overall impact of droughts on the population and, more importantly, how much well-being would be generated by the water savings enabled by Oerth. **These complex calculations estimate that Oerth's technology would generate 24 158 WALYs in the US in 2035 solely based on a reduction in water use.**

GHG Emissions

Oerth also reports that its products can reduce CO_2 emissions, from a maximum of 1 000 kg per acre for plant resilience, to a minimum of 10 kg per acre for the other products. Extrapolated across Oerth's total production, this equates to a **reduction of 445 million kilograms of CO_2, which is equivalent to taking 160 000 cars off the road in the US for one year**[17,18]. Using a method to assess the long-term effects of emission reductions on climate change over the next 100 years, the HRI has estimated the number of environmental disasters that could be prevented and the proportion of global emissions impacted by Oerth's practices. According to these calculations, Oerth's CO_2 reductions will generate **4 510 WALYs** over the next century.

Productivity

Oerth estimates that applying its product will generate net benefits for farmers ranging from 50.58 USD per acre for water use efficiency, to 1 517 USD per acre in plant resilience production, and an additional 60.70 USD per acre from insect, disease, and weed control. Assuming the reported total production, which ranges from a minimum of **247 thousand acres for plant resilience** to **124 million acres for insect control** in the US in 2035, Oerth could generate a total of **2.3 billion USD for farmers in the US**. The HRI has developed a method to calculate the effect of these economic benefits on the wellbeing of the population. According to the latter calculations, the effect of these economic benefits on the wellbeing of the population will result in **1 529 WALYs**.

Total Targeted Population
Wellbeing Impact

In total, Oerth's contributions, including productivity gains, water efficiency improvements, and CO_2 emissions reductions, will generate an anual **30 200 WALYs in 2035 for Oerth's US target audience, which is comparable to eliminating food insecurity for 150 000 Kenyans for one year**. This substantial impact reflects Oerth's ability to enhance both the agricultural sector's profitability and its sustainability, creating significant benefits for human wellbeing and environmental health over the long term.

Total Scaled Population
Wellbeing Impact

When taking a next visionary step and assuming that Oerth could supply all farms in Japan, US, and EU5 markets (Germany, Spain, Italy, France, and UK), their target coverage would expand to **917 million acres, resulting in 464 trillion liters of water savings, 13 billion kg reduction in GHG emissions and a 59 billion USD revenue increase**. Oerth's contributions, including economic gains, water efficiency improvements, and CO_2 emissions reductions, would therefore allow for **981 000 WALYs** gained, which is equivalent to doubling the net monthly income of the whole population of Kazachstan (more than 13 million people).

Case Study – Apollo Agriculture

Enabling smallholder farmers in emerging markets to grow their business

“By harnessing digital solutions, Apollo Agriculture is improving farmers’ livelihoods and unlocking the potential of small-scale farmers, leading to better harvest outcomes.”

Apollo Agriculture is an agri-fintech platform that helps small-scale farmers in emerging markets maximize profits. By leveraging machine learning, remote sensing, and mobile phones, Apollo provides financing, high-quality farm inputs, and optimized advice that can more than double farm profitability. Apollo offers everything a farmer needs to farm profitably—financing, farm inputs, advice, insurance, and market access—as a one-stop solution. Satellite data and machine learning enable better credit decisions, and automated operations keep costs low and processes scalable, allowing small-scale farmers to invest in and scale their food production.

Apollo's four key services include:

Farm inputs (seeds, chemicals, fertilizers) from leading providers

Insurance to de-risk farming operations

Financial loans to help farmers afford the best products

Digital and in-farm advisory to enhance farming outcomes

How It Works

Farmers can purchase inputs through Apollo using cash or credit. If they opt for credit, Apollo's machine learning credit models provide instant financing decisions. Farmers can then choose the necessary products from Apollo's digital store and pick them up at a nearby agrodealer—Apollo partners with nearly 1 000 agrodealers to ensure accessibility. All farmers receive best-in-class agricultural training. Farmers who purchase on credit receive insurance to protect their investment from unexpected circumstances in case the farmer's region is affected by severe drought or natural calamities.

Agricultural innovations like Apollo's often create ripple effects across society. Apollo's technology is projected to deliver the following benefits:

- Improved food security
- Increased financial inclusion
- Increased farmer revenues and profits
- Climate adaptation and resilience
- Rural job opportunities

Key Projected Outcomes
in Kenya and Zambia in 2029

500K

metric tons of incremental food production enough to feed 5M+ people

$150+

million USD in incremental income for farmers

20K+

incremental quality jobs in rural Africa with training and digital tools

1.5M+

farmers with access to quality inputs, sustainable agronomy and financing

	Target Population Value Year 5 after launch	**Targeted Population WALYs[A,B]**	**Value full population[C]**	**Full Population WALYs[C]**
Production	1.5 M farmers		6.8 M farmers	
Food Security	1.85 M people taken out of food insecurity	370.0 k	8.4 M people saved from food insecurity	1.7 M
Productivity	$150 M/ year	18.9 k	$430.4 M/ year	86.0 k
Employment	20+ K new employees	2.0 k	91 k new employees	9.1 k

Total net population benefit of **390 900 WALYs** in Kenya and Zambia

[A] Launch year = 2024. Launch+5 = 2029
[B] Target population geography: Kenya+ Zambia.
[C] Assuming Apollo could help the same percentage of farmers in Kenya, Zambia, Tanzania, Uganda, Sudan, Angola, Ghana.

Food Security

Apollo's solutions are expected to increase food production to incrementally feed 5 million people annually by 2029. According to the World Values Survey, 37% of this population experiences food insecurity. By applying 37% to the 5 million people fed, Apollo would be assisting **1.85 million people out of food insecurity**. Data suggests individuals suffering from food insecurity in Africa report 20% lower life satisfaction than those with adequate food access. By improving food security, an additional **370 000 WALYs** could be generated through improved living conditions.

Productivity

Furthermore, Apollo aims to improve farmer profitability in Kenya and Zambia, with projections showing an average increase of **100 USD per farmer in 2029**. With the aim of reaching 1.5 million farmers in 2029, a total benefit of **150 USD million** is estimated — generating an approximate of **18 900 WALYs**.

Employment

The Happiness Research Institute has estimated that unemployment reduces life satisfaction by **10%**. By employing **20 000+ people** and thereby increasing life satisfaction, Apollo will generate an additional **2 000 WALYs**.

Total Targeted Population
Wellbeing Impact

In total, through Apollo's impact on wealth, economic stability, and food security is expected to generate **390 900 WALYs in 2029 in Kenya and Zambia**. **This impact is comparable to giving a job to all unemployed in Great Britain for one year**, reflecting Apollo's significant contribution to enhancing the agricultural sector's profitability and long-term human wellbeing.

Total Scaled Population
Wellbeing Impact

When taking a next visionary step and assuming that Apollo's technology is applied to a similar percentage of farmers in Kenya, Zambia, Tanzania, Uganda, Sudan, Angola, and Ghana, Apollo's reach would expand to **6.83 million farmers**. This could generate an **additional 430.4 million USD** in income, improve food security for **8.4 million people**, and create **91 000 new jobs**. The total scaled wellbeing impact would amount to **17 801 212 WALYs**, **which is equivalent to doubling the monthly net income of US citizens for one year**. This magnitude demonstrates Apollo's vast potential to elevate societal wellbeing across multiple regions.

Our return in humanity.

We are impact makers and innovators.
We are pioneers and trailblazers.

5 Credentials

The Leaps by Bayer Team

Global Offices

Europe /

Basel
Berlin

North America /

Boston
San Francisco
St. Louis

Asia /

Singapore

Team Members

01
Paimun Amini
Senior Director of Venture Investments Agriculture

02
Natasa Bazdarevic
Administrative Support Brand & Community Engagement

03
Juergen Eckhardt
Head of Leaps by Bayer

04
Rakhshita Dhar
Senior Director of Venture Investments Health

05
André Guillaume
VP / Head of Brand & Community Engagement

06
Doerte Fiebiger
Brand & Community Engagement Support

07
Ruzha Draganova
HR Business Partner

08
Lucio Iannone
VP of Venture Investments Health

09
Karyn Riegel
Deputy Director of Brand & Community Engagement

10
Billie Othman
Executive Assistant

11
Ingo Klöckner
Head of Portfolio Strategy & Reporting

12
Denise Boehme
Director of Portfolio Strategy & Reporting

13
Sara Olson
Director of Venture Investments Agriculture

14
Neele Piekarz
Brand & Community Engagement Associate

15
Fabio Pucci
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16
Nicki Saee
Brand & Community Engagement Associate

17
Derek Norman
VP of Venture Investments Agriculture

18
Pamela Sisson
Senior Director of Legal Affairs

19
Pei Sze Ng
Director of Venture Investments

20
Alev Oezmen
Portfolio Strategy & Reporting Support

21
Kira Peikoff
Deputy Director Communications


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Carbon Offsetting

Climate change is leading to global challenges.

As an impact investor, we are committed to challenge our own thinking and our marketing practices in terms of its environmental impact. In line with these efforts, we wanted to create a climate compensated Impact Report that meets our standards of quality but simultaneously impacts the environment as little as possible.

Our approach to a climate compensated Impact Report

How did we achieve this?

By continuous project management tracking that allowed us to calculate the CO_2 emissions generated throughout the content creation process.

How did we offset our carbon emissions?

Through buying carbon credits from our Leaps portfolio company Andes. Andes offers public services that allow companies to neutralize their emissions with a carbon price of 212 USD per ton.

Andes engineers microorganisms to permanently remove CO_2 from the atmosphere. Their beneficial microorganisms are added to the soil along with agricultural seeds, such as corn and wheat. These microorganisms grow with plant roots and accelerate the conversion of CO_2 into minerals. With rainfall, the minerals move deep into the soil, making room for annual CO_2 removal.

What else did we do?

A main contributor to the climate emissions of creating such an Impact Report lies in the printing of the document.
This hard copy is a climate neutral report, printed on 100% recycled paper in Germany. We ensured that all 75 printed editions have been compensated through buying carbon credits from the Leaps portfolio company Andes.

Neutralizing emissions through carbon credits from Andes

andes

CLICK OR SCAN THE QR CODE TO LEARN MORE ABOUT ANDES

Curious to learn more about WALY?

Read our last two papers about our universal metric ‘WALY’ that measures impact investing beyond financial ROI and see how our 10 Leaps framework could generate return for humanity.

CLICK OR SCAN THE QR CODE TO READ ‘WALY’ REPORTS

Would you like to adopt WALY to assess the impact potential of your technology or portfolio?

We believe our wellbeing metric has the potential to be adopted for nearly every industry’s needs. We are more than happy to help out and share our methodology with all, who are interested.

Let’s set up a call and talk more!

Reach out to:

Ingo Klöckner
ingo.kloeckner@bayer.com

Denise Böhme
denise.boehme@bayer.com

Nicki Saee
nicki.saee@bayer.com

Manifesto

We believe in what we can prove.
In facts and figures. In evidence.

But at the same time we are fascinated by the things we can't yet prove.

The small things – and the big questions that move humankind.

Our achievements are the result of our insatiable curiosity and our stubbornness about never giving up.

We love the problem, but adore the solution.

We are analytical and creative.
We are critical and passionate.
We scrutinize and practice.

We are architects of possibilities where others only see limitations.

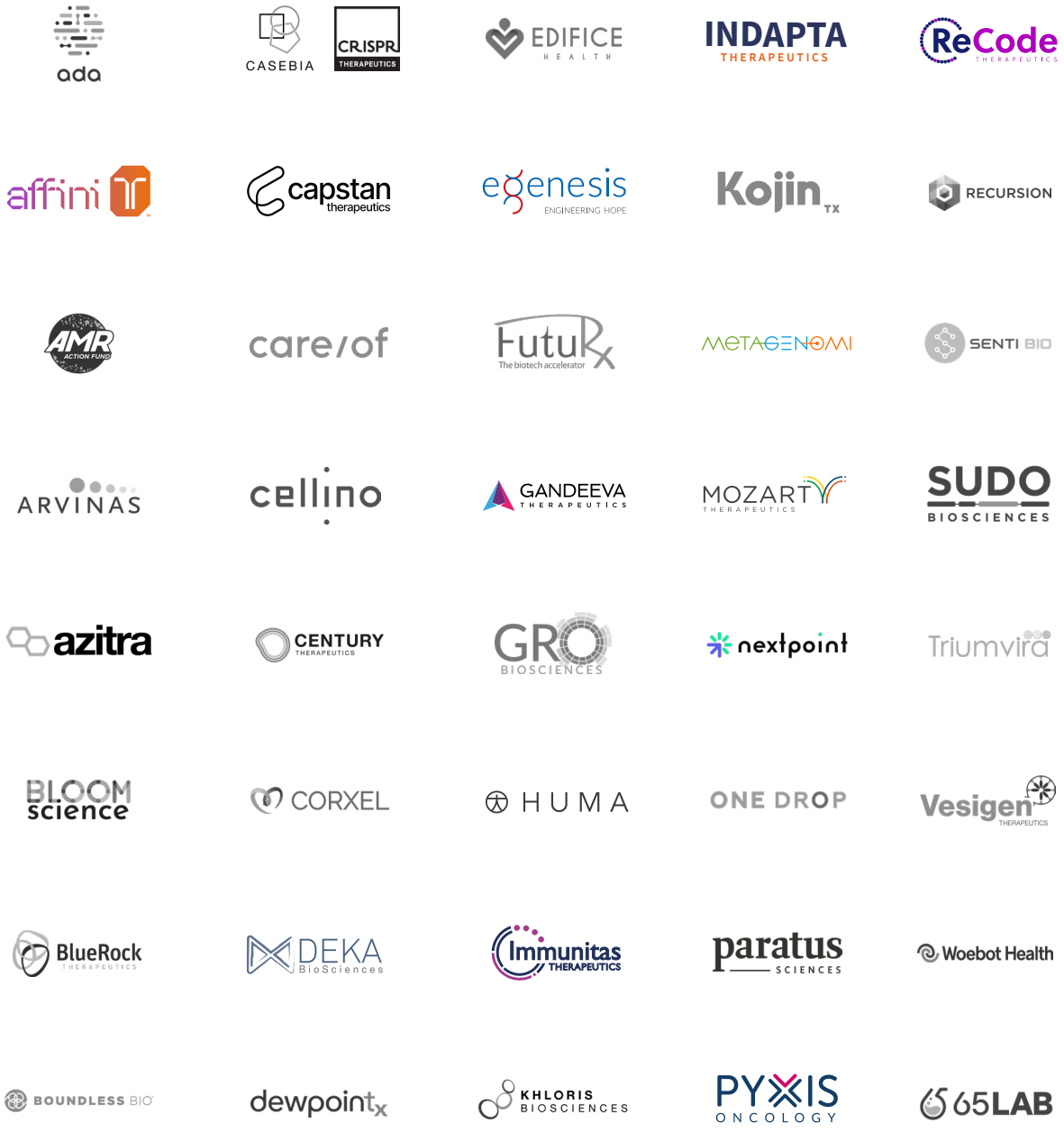
We are logicians finding riddles worthwhile enough to spend a lifetime pondering.

We are advocates for nothing less than changing the world for the better.

Not because we're asked to do it, but because we have to.

Health

Moving from prevention to cure



Portfolio companies featured in our Impact Report are highlighted

AgBiome
FARMLEAD
pairwise
AMFORA
FORK&GOOD
Sound
andes
grãodireto
RANTIZO
Apollo Agriculture
GUARDIAN AGRICULTURE
ukko
Atomwise
JOYN BIO
UNFOLD
ChrysaLabs
NewLeaf symbiotics
CoverCress The cover crop that pays
NuCicer
EARTH OPTICS
Gerthbio

Agriculture

Moving from more to better

Call to Action

[1] https://www.fao.org/newsroom/detail/hunger-numbers-stubbornly-high-for-three-consecutive-years-as-global-crises-deepen--un-report/en
[2] https://population.un.org/wpp/Publications/Files/WPP2019_10KeyFindings.pdf
[3] https://www.nature.com/articles/s43016-021-00225-9
[4] https://www.who.int/news-room/fact-sheets/detail/hypertension
[5] https://diabetesatlas.org/atlas/tenth-edition/
[6] https://www.who.int/news/item/01-02-2024-global-cancer-burden-growing--amidst-mounting-need-for-services
[7] https://www.who.int/data/gho/data/themes/topics/topic-details/GHO/ncd-mortality

Letter f. J. Eckhardt
Executive Summary

[8] https://www.fao.org/newsroom/detail/un-report-global-hunger-sofi-2022-fao/en
[9] https://ourworldindata.org/grapher/ghg-emissions-by-sector?time=1990..2020&country=~ESP
[10] https://www.un.org/waterforlifedecade/human_right_to_water.shtml

Agriculture - WALY Outcomes

[11] https://ourworldindata.org/grapher/ghg-emissions-by-sector?time=1990..2020&country=~ESP
[12] https://www.un.org/waterforlifedecade/human_right_to_water.shtml
[13] https://ourworldindata.org/grapher/annual-co2-emissions-per-country?country=~DEU
[14] https://www.fluidra.com/projects/olympic-swimming-pool-characteristics/#:~:text=In%20general%2C%20an%20Olympic%2Dsize,be%20between%2025°C%20and%2028°C.

Case Study – Oerth Bio

[15] https://agresearchmag.ars.usda.gov/2011/aug/water
[16] https://www.pioneer.com/us/agronomy/water-corn-growth.html
[17] https://transportgeography.org/contents/chapter1/what-is-transport-geography/world-vehicle-use-indicators
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Case Study – ReCode

Quality of Life in Cystic Fibrosis Children
Life satisfaction cystic fibrosis children
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3663304/

Questions on Life Satisfaction for Adolescents and Adults With Cystic Fibrosis
Life satisfaction cystic fibrosis adults
https://www.sciencedirect.com/science/article/abs/pii/S0012369216343732

WALY Calculation Health

World Health Organization: Global Cancer Observatory
Incidence & prevalence cancer
https://gco.iarc.fr/en

Survey of Health, Aging, and Retirement in Europe (SHARE)
Life satisfaction, health, socioeconomic status, and social networks
https://share-eric.eu/data/
*In accordance with the SHARE Conditions of Use governing the use of SHARE data, an acknowledgement containing the following information has to be included in all publications using SHARE data (see https://share-eric.eu/data/data-access/citation-requirements)

WALY Calculation Agriculture

Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers
Land used to produce one kilogram of food
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Greenhouse emissions

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Deaths from risk of non-optimal temperatures, from the cause of neglected tropical diseases and malaria,
http://ghdx.healthdata.org/

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Total agricultural emissions per country per year
https://ourworldindata.org/grapher/emissions-from-food?tab=chart

Food and Agriculture Organization (FAO)
Food production in total kg per country per year
https://www.fao.org/faostat/en/#data/QCL

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Emissions per kg food
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Emissions by agriculture per country per year
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Records of natural disasters
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Local Environment	**Food and Agriculture Organization of the United Nations (2019)** Use of chemical and mineral fertilizers https://ourworldindata.org/fertilizers
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Productivity	**Food and Agriculture Organization (FAO)** Price of production per kg of food items per country per year https://www.fao.org/faostat/en/#data/PP
	Economic Research Service USDA Farming net income per acre https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/farming-and-farm-income/
Social Impact	**World Bank** Total labor force and the percent of the labor force in agriculture https://data.worldbank.org/indicator/SL.TLF.TOTL.IN; https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS
	World Values Survey Life satisfaction gap between employed and unemployed individuals https://www.worldvaluessurvey.org/wvs.jsp
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Water Use (Drought Model)	**Global Water Monitor** Droughts areas by year and the amount of water needed per hectare to save that area from drought https://www.globalwater.online/global-water/index.html
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