



## 2020 Annual Impact Report



Pangaea Ventures is the Global Leader  
in Advanced Materials Venture Capital

# We impact entrepreneurs making an impact on the world

“The world’s most fundamental problems won’t be solved by software solutions alone. We are convinced that pairing entrepreneurial drive with breakthrough hard-tech innovations makes for great investments and at the same time helps the world become a better place.”

**Chris Erickson**

Founder & General Partner



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# Introduction

2020 was the year of COVID but will soon also become known as the year impact investing came of age. Traditionally, asset managers have used ESG (Environmental, Social, and Governance) screening criteria to mitigate against overexposure to external risks such as climate change. Impact investing provides opportunities for investors to leverage their funding to drive solutions to the world's fundamental challenges. In January of 2020, the world's largest asset manager, Blackrock announced that it would target investment opportunities focused on climate and sustainability. Fast forward a year later, and Blackrock has stated that its clients are "increasingly focused on the significant economic opportunity that the transition will create, as well as how to execute it in a just and fair manner. No issue ranks higher than climate change on our clients' lists of priorities. They ask us about it nearly every day." This is not a fad that will fade away.

Fortunately, Pangaea's portfolio companies are among an important generation of start-up companies commercializing high impact technologies. With the world waking up to the urgency of solving these challenges, the impact of our portfolio continues to accelerate every year. In 2020, Cnano and CarbonCure continued to be strong contributors in achieving an estimated cumulative portfolio CO<sub>2</sub> reduction of 1.1M tons. Hazel Technologies and Vestaron are now growing contributors while also meaningfully contributing towards our targets in fresh water and food production. Pangaea invests in companies that improve people's lives through enabling better and more affordable healthcare. While Redlen Technologies continued to be the most significant contributor to our estimate of lives impacted by portfolio companies, we expect to see increasing contributions from companies such as Modulim and Sun Genomics in the years to come as they touch a growing number of lives.

When compared to even incremental operational changes at the world's largest companies, the magnitude of our impact is relatively small. Fortunately, many high impact technologies scale exponentially and companies that employ linear thinking will be left behind. At Pangaea, we believe that impact focused venture capital plays a critical role in helping entrepreneurs achieve transformative impact. Capital needs to be deployed with accompanying doses of discipline, experience, and creativity. We have always believed diversity enables us to make the best investment decisions. We're confident that with the addition of two female partners in 2020, we will continue to benefit from diverse team members and viewpoints in the years to come.

Pangaea made three new investments during 2020: [Sun Genomics](#), [Tidal Vision](#), and [Prime Roots](#). These companies each have the potential to drive significant impact within the portfolio. Their products improve chronic health conditions associated with the gut microbiome; treat wastewater; enable safer textiles; grow healthier and higher yielding crops; and create sustainable, delicious, and nutritious plant-based food. Each of these companies are addressing fundamental global challenges and are led by entrepreneurial CEOs from wildly different backgrounds. What they each have in common is vision: Vision to use their companies to affect meaningful global impact.

In 2021, Pangaea Ventures plans to make the first investments from the Pangaea Ventures Impact Fund, and therefore we have set targets for our portfolio out to the year 2030 which aligns with the timeline for the UN Sustainable Development Goals.

# 2020 Targets and Actuals



## CO<sub>2</sub> reduction

55 million tons mitigated by 2030

= equivalent to taking 11.8 million cars off the road for one year

Highlighted Portfolio Companies:



Pangaea’s portfolio companies have cumulatively mitigated an estimated 1.1 million tons of CO<sub>2</sub> of emissions as of the end of 2020. As was the case in 2019, Cnano and CarbonCure continued to improve their market leadership positions in lithium ion battery conductivity additives and low carbon concrete respectively. We were pleased that two additional companies were also meaningful contributors in 2020. Both Vestaron and Hazel Technologies had breakout years in terms of revenue growth, and, given the high carbon intensity of food and agriculture, the impact on carbon emissions was significant in 2020.

# 2020 Targets and Actuals



## Water

153 billion m<sup>3</sup> saved or produced by 2030

= equal to 4x the annual water used by every household and business in Canada

Highlighted Portfolio Companies:



In 2019, Pangaea’s portfolio companies were well short of reaching our water impact target. However, we made significant progress this past year, treating or saving a cumulative estimate of 4 billion m<sup>3</sup> of water. The primary contributor was Vestaron which has a biological pesticide platform that matches or exceeds the performance of traditional synthetic pesticides. With Vestaron’s growth and expected increased contribution from new portfolio company Tidal Vision, the portfolio may well exceed its estimated impact by the end of 2021.

Crop protection is vital to maintaining agricultural yields and with existing products losing performance due to pest resistance, Vestaron’s entirely new modes of action will be required for farmers to maintain or increase yield and minimize the impact intensity of every pound of crop produced. Vestaron is primarily selling to farmers growing particularly thirsty crops such as fruits, vegetables and nuts. For example, every almond is estimated to require 1.1 gallons of water and the United States produces close to 1.7 trillion almonds each year.

# 2020 Targets and Actuals



## Food

50 million tons of food production increased

= Enough food to feed 1.4 million people for a life time.

Highlighted Portfolio Companies:



hazel technologies inc.



Portfolio impact in our food category mirrored the performance in the water category as the two are closely linked. Portfolio companies achieved an estimated 266k tons of food production enabled (or waste avoided). This was a significant improvement over 2019. We were encouraged to see that in 2020 the world really began to take notice of the huge amount of food wastage that occurs in the supply chain. Hazel Technologies is leading the charge to provide technologies that can reduce food waste from farm to grocery store shelves, and in doing so, reduce the carbon and water intensity of the food that we consume. A new addition to the portfolio is Prime Roots which produces a whole food protein using koji. As they further ramp production of their plant-based meats and ready to eat meals, we expect the company will be an increased contributor to our portfolio impact in the years to come.

# 2020 Targets and Actuals



## Lives

18 million lives impacted

= Roughly the population of Chile

Highlighted Portfolio Companies:



We estimate portfolio companies have had a cumulative impact on 658,000 lives which exceeds our target. Portfolio impact has historically been led by Redlen Technologies, and the company's sensors for nuclear imaging are used in applications such as cardiology. We are even more excited about the progress the company continues to make on next generation sensors for CT imaging. This breakthrough technology will have a meaningful impact on how doctors diagnose a wide variety of conditions ranging from cancer to heart disease. We are also proud of the progress Modulim made in rolling out its imaging technology to help detect and prevent diabetic foot ulcers and other vascular conditions. Our most recent investment in the health sector, Sun Genomics, continues to receive outstanding customer reviews and is helping its customers improve their gut health.

# Imagine a world...

Without fake medication

With fewer foot amputations

With more food and fewer harmful chemicals

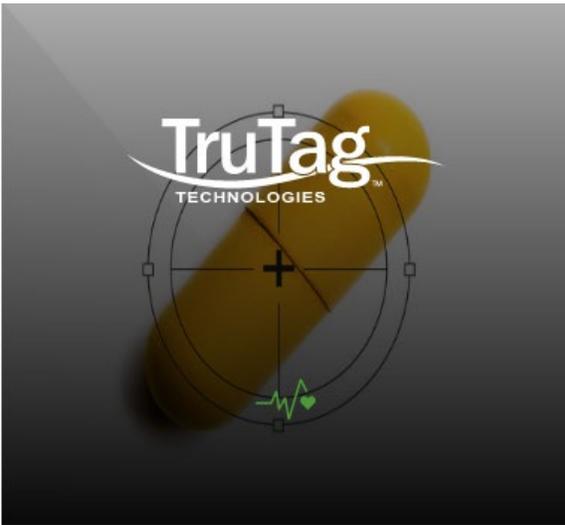
Where carbon dioxide is used to reduce carbon dioxide emissions

Where sunshine and wind are stored

Where protein is produced without farmland



## Imagine a world...



Every year, \$200B in counterfeit pharmaceuticals make their way into our homes. These fake capsules and pills threaten global health and contribute to hundreds of thousands of preventable deaths. TruTag uses secure, invisible, edible barcodes embedded directly onto drugs and other critical consumable products to ensure authenticity and provenance. By turning every drug into a data point, TruTag enhances the resiliency and transparency of supply chains. Furthermore, digitizing drugs with TruTag's tags and a user-friendly mobile app improves patient outcomes by stopping counterfeiting and reducing non-adherence.



Our changing healthcare system demands that we shift from reactive to proactive care. According to the CDC, over 10% of the U.S. population has diabetes while the medical costs to care for people with diabetes have risen 26% over a five-year period. Of all diabetes-related complications, a serious foot ulcer and subsequent amputation are the most preventable. Yet there is no way to assess circulatory health beyond conventional physical examination. Modulim's technology helps clinicians pinpoint compromised circulation so that preventative care can start before it is too late. Early detection helps patients living with diabetes and other vascular complications live healthier lives.



Crops face multiple challenges from the day they are planted to the day they are harvested. Despite the use of genetic modification, crop protection, and fertilizers, agriculture yield improvements have flattened. This creates a threat to global food security. NewLeaf Symbiotics uses the power of nature to effectively strengthen the immune system of plants. Their proprietary beneficial bacteria communities can increase yield and quality while cutting chemical use by 50%.

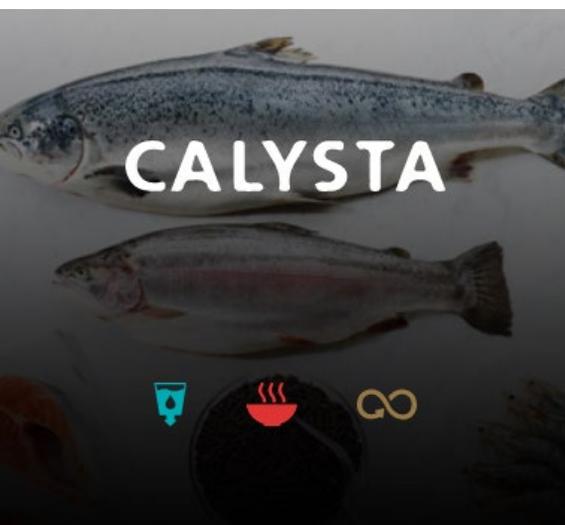
## Imagine a world...



As buildings become more energy efficient and the world embraces renewable energy and energy efficiency, the embodied carbon from construction materials is becoming an increasing proportion of our built environment's carbon footprint. By far the biggest contributor to CO<sub>2</sub> emissions is the cement used in concrete, representing approximately six percent of global carbon emissions. By leveraging carbon dioxide as an ingredient to make better concrete with less cement, CarbonCure is on a mission to reduce global carbon dioxide emissions by 500 megatons per year.



Deep decarbonization requires deep renewable energy penetration. With the inherent variability of solar and wind, the need for energy storage will grow exponentially as renewable penetration increases. Leveraging low cost and sustainable iron chemistry, ESS offers a safer and more scalable storage solution compared to incumbent lithium ion technology.



Demand for protein is increasing, yet meat and seafood production have an outsized environmental and social impact relative to alternate sources. The drive to satisfy the global demand for protein is causing irreparable damage from deforestation and biodiversity loss. Calysta will feed more people with less resources as its FeedKind product leverages efficient gas fermentation. If used as a substitute for fishmeal, 100,000 tons of FeedKind could replace between 420-450k tonnes of wild-caught fish, or the land area of Chicago and nine billion liters of water used for growing soy.

# Scaling Impact with Exponential Technologies

In 2020, the world's largest companies continued their leadership in addressing the world's biggest global challenges. Walmart committed to net-zero carbon emissions by 2040 and 100 percent renewable energy by 2035. Amazon made a similar net-zero emission commitment and allocated billions of dollars for investment in decarbonization and sustainability start-ups. Petrochemical giants Dow Chemical and BP have both committed to net-zero emissions by 2050. The public markets have validated and rewarded the intention to act with these companies outperforming their peers in 2020. With these large companies capable of impacting a gigaton of greenhouse gas emissions, are nascent start-ups really able to move the impact needle? We think so!

Status quo technologies are not capable of economically solving the world's most fundamental challenges. For decades, start-ups have proven that they have a key advantage in bringing breakthrough technologies to market with urgency and creativity. The exponential scaling that can be achieved by starting with a clean slate ensures that the best ideas don't die on the vine. Once these technologies and new business models gain a foothold, large companies are often well positioned to amplify scale exponentially. Recent examples of this within our portfolio are the Amazon-led funding round in CarbonCure Technologies, and a growth round in Calysta led by BP. The funding from BP is helping to build the world's largest protein production facility using gas fermentation.

High-impact hard-tech companies often require significant capital to scale after they have proven product market fit and de-risked the technology. While mass adoption through partnerships or acquisition can accelerate progress, growth capital is becoming less of an impediment. In 2020, Tesla delivered almost 500,000 electric vehicles as it financed its capital-intensive growth through the public markets. Had Tesla not led the way, we likely would not have GM announcing they intend to offer an all electric line-up by 2035.

Special Purpose Acquisition Companies (SPACs) are making this even easier for high impact companies to secure capital for exponential scaling. \$29 billion worth of capital was raised in SPAC transactions during 2020, with \$4 billion targeted at cleantech companies. With the number of sustainability SPACs increasing by the week, we expect this trend to continue in the years ahead.

Regardless of how these emerging technologies and companies grow, large companies that ignore this reality and do not take action should be reminded that only 40% of today's Fortune 500 companies will be on the list in 2030. Those ignoring the ability of breakthrough technologies to exponentially scale will most certainly do so at their peril.

# 2020 Impact Snapshots

With our final Fund IV investment recently completed, we spent some time in 2020 thinking about the evolution of our team. In an industry where making decisions with imperfect information is critical to success, diversity is a key ingredient for any investing team.

In the United States, 65% of VC firms had no female partners as of the end of 2019 according to [All Raise](#). Pangaea was one of those firms. However, that all changed in 2020, with the promotion of Janelle Goulard and addition of Sarah Applebaum as Partner. At Pangaea Ventures, half of the investing partners are female, well above the 13% industry average in the United States, and over half of our team is female. At Pangaea, the challenge of overcoming biases in decision making and reducing imperfect or skewed information is always top of mind. We believe that diversity in our team will lead to greater diversity in our portfolio and lead us to make better decisions overall.



## Global travel turns into community support

Venture Capital has always been a people business and Pangaea's team has historically logged a lot of air miles. In March of 2020, as business travel ground to a halt, we shifted to operating virtually and have been examining our business' impact on both our local and global communities. We are hopeful to resume meeting in person with our portfolio companies and colleagues soon. Starting in 2021, we have committed to purchasing carbon offsets for all of our air travel.

# Three CEOs changing the world



**Craig Kasberg**  
Founder & CEO



**We have heard a lot about plastic waste in the ocean. But you are solving a different Ocean challenge. What is it and how are you addressing it?**

Up to eight million tons of crustacean shells are discarded per year. We have developed a process for upcycling that waste into a high-performance biopolymer that can be harnessed to displace synthetic chemicals in industries such as agriculture, textiles, and water treatment. This in turn reduces the quantity of synthetic chemicals that find their way from these industries into our ocean ecosystem. The fact that our technology allows us to turn waste into something of high-performance value at a lower cost than synthetic chemicals illustrates the true power of the circular economy in improving the sustainability and economics of a wide variety of industries.

**You have just launched a product with a partner in the textile industry. How is that going to make the world a better place?**

We recently teamed up with Leigh Fibers, the largest textile fiber recycling company in North America. Our Tidal-Tex product line enables Tidal Vision to use nontoxic chitosan solutions to displace synthetic and heavy metal antimicrobials and halogenated fire retardants across the industrial and consumer textile industry. We are implementing this technology within Leigh Fiber's ~1M sq. ft facility which treats north of 150M lbs of textile fibers per year. With improvements in antimicrobial and flame retardancy, we expect Leigh Fibers' customers will be able to increase the recycled content in their end products - everything from automobiles to furniture. Given that the fashion industry is responsible for up to ten percent of global greenhouse gas emissions, if Tidal Vision is an enabler for more waste textiles to be upcycled, there is an impact on reducing those emissions as well.

**Increasing agriculture productivity is going to be key for a growing, more protein hungry population. How will Tidal Visions products help with these issues?**

Effective crop protection is essential to maintaining yield and productivity in the agriculture industry and to support a growing global population. Chitosan plays a key role in empowering regenerative agriculture as it has a unique mode of action as a plant elicitor in all types of crops at every stage of the plant life cycle. Chitosan application leads to increased yields and nutrient density, accelerated growth and germination rates, improved plant health, hardiness, resistance to pathogens as well as abiotic stresses (heat, drought, salinity, heavy metals, and more). Tidal Vision is making it easy and cost effective for farmers to realize these benefits of chitosan with our Tidal Grow product line. Tidal Grow can be formulated so that low application rates yield the desired responses within the plants and we are committed to further innovating in order to solve specific challenges faced by farmers.



**Kimberlie Le**  
Founder & CEO



**Animal agriculture accounts for approximately 15% of global greenhouse gas emissions, 30% of freshwater consumption and 70% of agriculture land usage. How is Prime Roots improving the sustainability of the food we eat?**

The most important thing to consider is that animals are inefficient at converting the calories from feed into protein. In the case of cattle, the feed to meat production ratio is as high as 25:1. Some of these inefficiencies actually manifest into methane, a particularly potent greenhouse gas. Even the peas which are used in many other plant-based meat products are mostly carbohydrates and a relatively small percentage of the total calories are extracted as protein. The koji used to produce our whole food protein is incredibly efficient, with a calorie conversion ratio only slightly higher than one. The result is less carbon dioxide and methane production and much lower water and land usage for every pound of protein we can use to feed the world.

**In order to see massive impact there needs to be mass adoption. Will Prime Roots be able to drive accelerated adoption compared to existing plant based alternatives?**

Plant-based meat alternatives have been available for years and have been slowly growing in market share as the quality of offerings incrementally improve. However, existing offerings typically lack the taste profile of traditional meats and are often highly processed. Our koji protein breakthrough allows us to create nutritious and delicious products with a very clean ingredient list. Another topic we are obsessive about at Prime Roots is making our products highly accessible for our customers. We have created both ready-to-eat meals for the busy person who is on the go and also raw protein options like our bacon strips that customers can cook up themselves for their favorite dishes. Customers can count on Prime Roots products to be ready in their refrigerators on-demand for any meal of the day. We further improve the ease and experience for customers with our direct to home delivery model.

**2020 exposed us all to the fragility of our health. Can Prime Roots help make us healthier?**

There is some evidence that industrial agriculture can contribute to the introduction of new viruses that can transmit to humans. Combined with the widespread transmission of COVID-19 within traditional meat processing facilities, some consumers are questioning the health and safety risks of animal agriculture, where our meat comes from, and how it can be better. In addition to these acute risks, it is widely known that animal-based products, especially red and processed meats are responsible for inflammation and increased risk factors for chronic conditions such as heart disease. Prime Roots' products contain a complete amino acid profile, are rich in micronutrients, and even contain soluble fiber that provides numerous health benefits. Our customers feel great and can feel great about nourishing their bodies and the planet



**Sunny Jain**  
Founder & CEO



**You are solving the critical problem of gut dysbiosis through custom probiotics. How does Sun Genomics improve lives?**

Over the last decade, research into gut dysbiosis (deficiency of beneficial bacteria in the gut) has shown a direct relationship between the immune system, depression, and other conditions. We can collect the data you need to figure out how specific microbes relate to specific conditions. Personalized data-driven analytics linked together with peer-reviewed literature allows us to tailor personalized solutions to resolve specific conditions. We track improvements with regular testing with the ultimate goal being the resolution of the dysbiosis. In the future, we plan to further enhance outcomes with next generation probiotic strains with specific therapeutic effects.

**Health-related spending represents a large and growing part of GDP.**

**How can Sun Genomics reduce health spending costs?**

We are working to figure out the outcomebased economics of our

approach. Modest monthly investment in probiotics and regular testing will likely reduce the future costs of more drastic interventions while improving our customers' economic potential is certainly an interesting proposition that would be valuable to healthcare providers and our customers. We are increasing our focus on the healthcare system and payers, mostly on how to show the value of preventative care. That could involve an early companion diagnostic based detection model combined with microbiome-based symptom relief and medication alignment. We are encouraging our ecosystem to analyze the gut health of children. The earlier you understand the gut microbiome, the earlier you can make changes and avoid costly long-term conditions like asthma/allergies, irritable bowel syndrome, and diabetes. In the next 5 years, landmark research will highlight that the young microbiome has an opportunity to be shaped. Another focus area relates to the connection between the microbiome and the brain, and we have studies

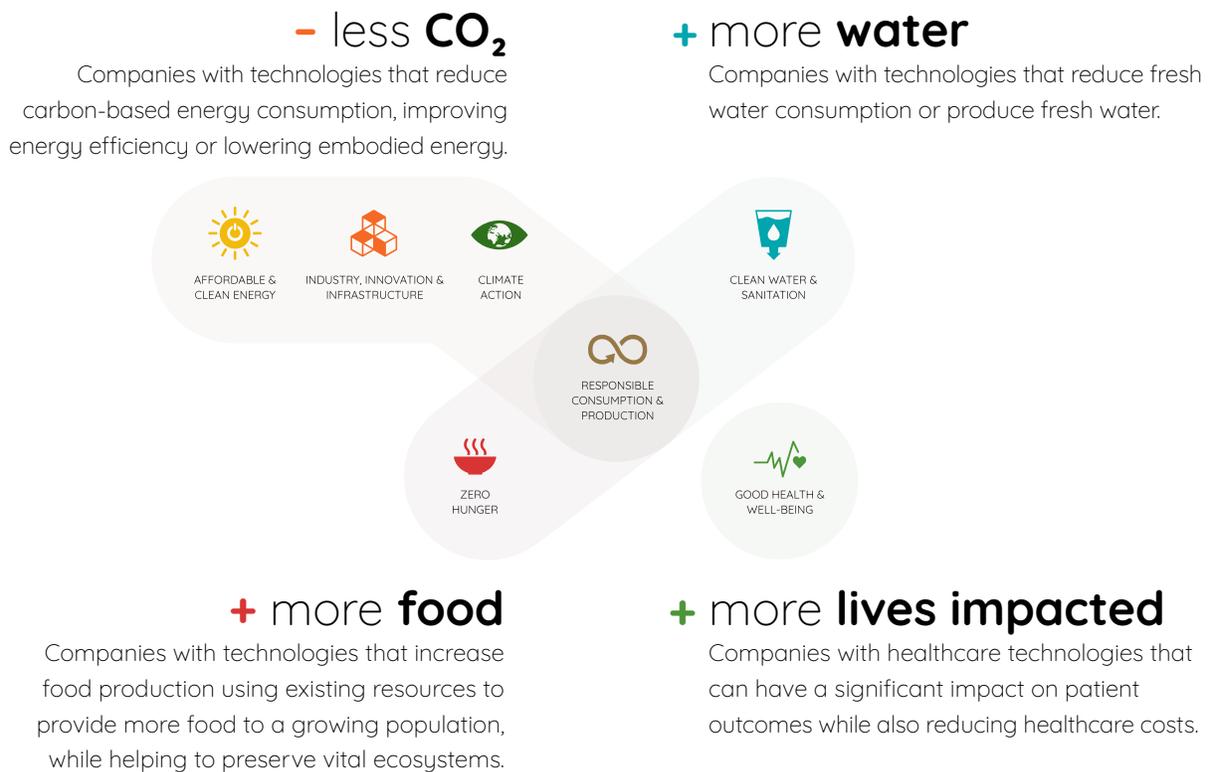
ongoing that we hope will help people with conditions such as autism.

**60-70 million Americans suffer from a gastrointestinal condition, and often these conditions are difficult to treat using traditional medicine. How is Sun Genomics' approach different?**

The statistic highlights how massive this problem is and people continue to live with the suffering. Our customers are telling us that Sun Genomics has the ability to resolve many of these issues. Our role is to decrease the medical burden and get people back to living full lives without heavy reliance on medications and other treatments. In the next 5 years there will be landmark research to highlight that the young microbiome has an opportunity to be shaped. Another area of focus relates to the connection between the microbiome and the brain and we have studies ongoing that we hope will help people with conditions such as Autism and ASD.

# Notes on Impact methodology

Pangaea’s investment process includes a commitment to quantify and qualify the impact of the business’s activities. As detailed in our previous Impact Reports, Pangaea has developed an impact model that enables us to monitor and measure impact creation across industries. The United Nations Sustainable Development Goals were used as a framework for Pangaea to select a handful of simple and quantifiable metrics that are relevant to the wide number of technologies and markets within our investment scope.



From initial screening and through the due diligence process, Pangaea evaluates opportunity through an impact lens in order to gain insights into the magnitude of the problem being solved and the scalability of the solutions being developed. With the 2030 impact goals in mind, Pangaea’s deal analysis includes consideration of impact criteria that the technology must address in order to be approved for investment. The impact considerations are not meant to replace financial returns but to provide us with an holistic view of potential investment candidates.

## 2030 Impact Goals

### Pangaea’s Impact Strategy





WE ARE HARD TECH INVESTORS.  
WE ARE IMPACT INVESTORS.