

Annual Report 2024

Supporting climate-impacting startups
and early-stage companies



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Letter from the Chair, Trish Maxson



The catastrophic consequences of climate change showed no signs of abating in 2024. Fossil fuel emissions increased to an all-time high, the hottest days ever recorded occurred in July, and current predictions have us on track for approximately 2.7 degrees Celsius peak warming by 2100.¹ We believe more strongly than ever in our mission to provide multifaceted support for approaches to mitigate these consequences.

Thanks to the ongoing support of JLL, we issued 18 loans to recipients contributing to a more sustainable future, amounting to USD4.75m, adding to a total portfolio of 39 loans. Our 2024 graduate companies have attracted an extraordinary USD49.4m in additional funding since receiving their JLL Foundation loan. Four portfolio companies repaid their loans, and this year saw one dissolution, LayerUp. Founder and CEO, Evan Arnold has since sold his software to a larger company, which recognizes its potential to make the insulation process and contractors' lives easier. We commend Evan for his efforts and are very pleased that the fruits of his ingenuity and hard work will live on.

Beyond providing loans, the Foundation hosted a second in-person event, enabling a number of our loan recipients to benefit from introductions to private equity and venture capital firms, family offices, and other foundations. This support was deemed by recipients as being of great value at a time in their companies' development when raising capital is so important. The event also gave participants an opportunity to share experiences with their peers and to discuss the issues unique to startups.

2024 saw the launch of a marketing mentorship pilot program, which offers JLL employees the opportunity

to get involved in working directly with our loan recipients. We thank Gayle Kantrou for her gift of time and expertise in creating and setting up the mentoring program. In 2024, JLL staff members dedicated 2,894 hours (362 working days) of volunteering time to administratively support the Foundation and to provide in-kind support to some of our startups. We hope to expand our efforts to include many more JLL employees in the work of the Foundation in the future.

Our board members have continued to be generous in sharing their expertise and counsel. I would like to thank them all and pay special tribute to Lib Hearle, who steps down this year. We welcome Laura Adams, Chief Human Resources Officer at JLL and a member of JLL's Global Executive Board, who joined our board in January 2025.

Finally, I am delighted to introduce Erin Meezan, Chief Sustainability Officer at JLL, who joined as our new Executive Director in January 2025. Erin is a recognized sustainable business advisor and frequent lecturer on sustainable business to senior management teams, universities and business audiences around the world. Erin said: "I am enormously impressed by the impact that the Foundation has achieved in such a short period of time and very excited to join as Executive Director. I look forward to building on the team's excellent achievements and to making my own contribution to its success."

Together, we remain focused on setting ambitious objectives, supporting transformative strategies, and encouraging innovation towards a brighter future for all.

¹ Bioscience, 8 October 2024, The 2024 State Of The Climate Report: Perilous Times On Planet Earth

Our impact in 2024

All our portfolio companies are mitigating the impact of climate change and contributing to a circular economy in multiple ways.

Carbon storage and removal emerged as a key theme this year, as evidenced by, among others, Aquarry, Inventwood, Plantaer and Phytostone. The number of companies that are directly decarbonizing the building sector grew substantially in 2024, with our support of Cyanoskin and Urban Machine, with a particular focus on multi-family buildings through Blip Energy, Cadence OneFive and Daisy Chain. Companies engaged in waste reduction as part of the transition to a greener, more sustainable future included Eco Brix, Mycocycle and Novoloop, alongside others cited above.

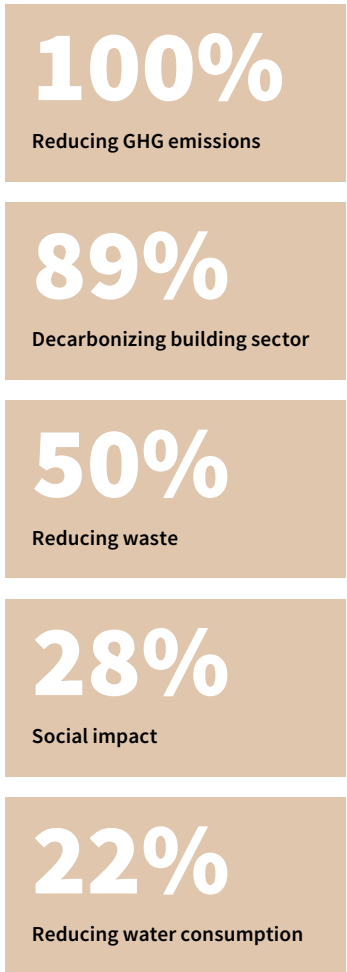
Our 2024 cohort of 18 portfolio companies are all reducing GHG emissions, 89% are directly decarbonizing the building sector, 50% are reducing waste, 28% are having a social impact, and 22% are reducing water consumption.

All 45 of our 2024, 2023 and 2022 loan recipients² are reducing GHG emissions, 87% are directly decarbonizing the building sector, 51% are reducing waste, 38% are reducing water consumption, and 33% are having a social impact.

² Excludes Malibu Milk and LayerUp



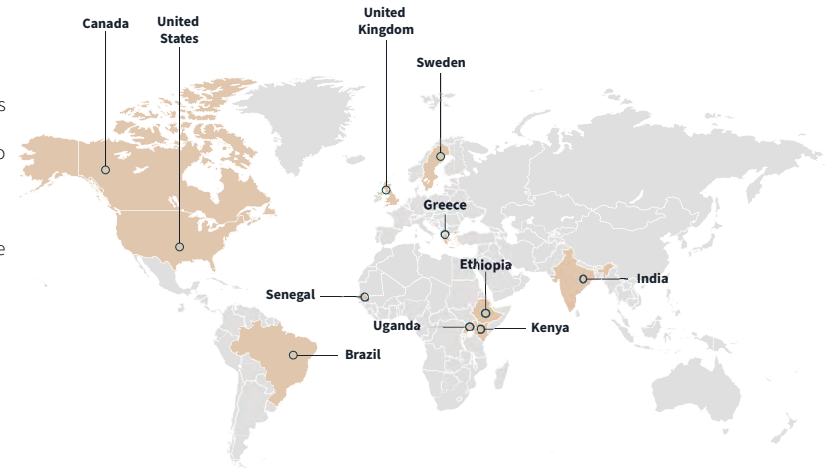
Mycocycle is one of several female-founded companies in our portfolio. Half the leadership team is female and across the entire team, over 60% of the employees are women or from multicultural backgrounds.



Geographic reach and ownership

Our portfolio companies are operational in 11 countries around the world. New regions covered in 2024 include Brazil, India, Senegal and Uganda. We hope to be able to support more companies in Asia in future.

Many of the companies we support comprise owners and their teams who have struggled to raise venture capital despite their excellent skills, the quality of their ideas, and the high standards of validation and prototyping demonstrated in their journey towards commercialization.



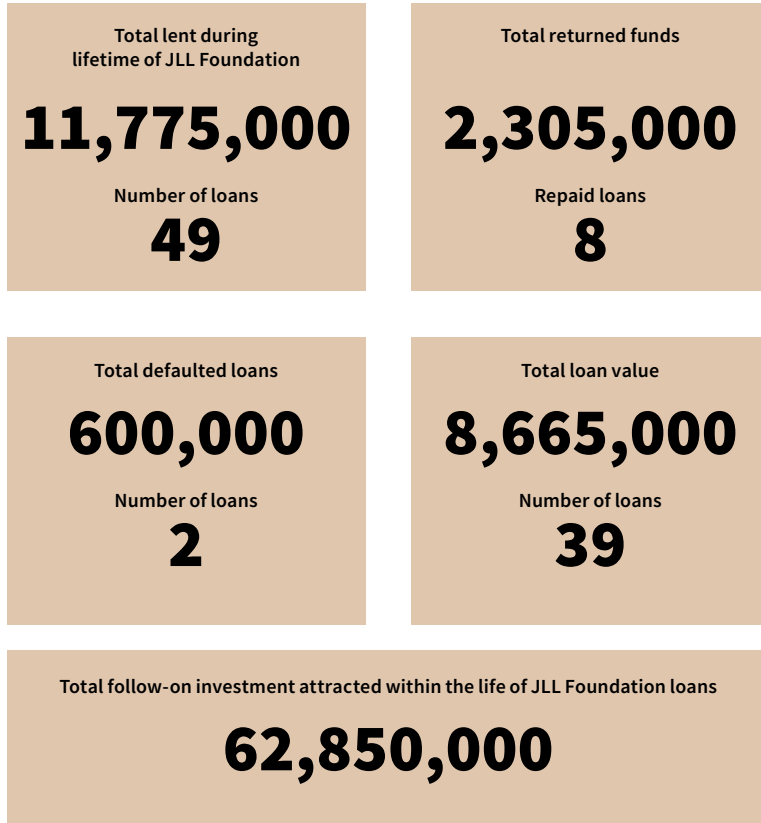
In their own words

How do portfolio company founders sum up what the JLL Foundation loan means to them?

Companies appreciated that the loan gave them **a chance to build revenue...at a good point** in their journey. For many, it **accelerated our maturing of the tech and 'go to market'**. The **unique structure of the no-interest loan**, which **helped us scale faster**, was a common refrain. Recipients valued our sector experience; **amazing to work with people so well versed in the built environment**. The support received from the Foundation was often described as **transformative**, particularly in a market with **few sources of capital for early-stage companies**.

Inertia-busting
Transformational Foundational
 Bridge-building **Catalytic**
Empowering Expert
 Founder-friendly
 Momentum-building

Cumulative financial report @ YE 2024 (USD)



Annual financial report 2024 (USD)

	#	USD
2024 total budget		4,385,000
Loan budget		4,000,000
Operations budget		385,000
Loan activity		
2024 budget loans made	15	4,000,000
Returned loans	4	1,495,000
Additional loans made with returned funds	3	750,000
Total amount lent		4,750,000
Remaining loan budget		745,000
Operations expenses		
Consulting fees		363,000
Marketing and communication costs		26,000
Total operations expenses*		389,000

Follow-on investment attracted by 2024 graduates USD49.4m

*JLL donated an additional 4,000 towards operations expenses and supports the Foundation with internal costs, such as staff salaries, expenses and in-kind support.

Building our community

Our second in-person event was again held at **Good Machine's** premises in San Francisco in October. Several of our portfolio companies were invited to meet potential investors, other funders, and their peers as part of our ongoing commitment to build our community and foster connections. The event included the kick-off of a pilot mentoring program focused on the marketing needs of startups. Our thanks to Good Machine for hosting and to all those who attended.

Alicia Cha Umphreys
Anthropocene Ventures

Fabio Ficano
Ares Management

Visraant Iyer
Bloomberg Center for Public Innovation

Albert Liang
dCarbonVC

Abby Gritter Zoradi
Gratitude Railroad

Andrew Biggs
Green Rise Partners

Rosana Rabines
GWP Impact

Radhika Malpani
Independent Investor

Chris Hale
Klear Inc. (formerly Kountable)

Jim Taschetta
MISTA

Caroline Bressan
Open Road Alliance

Dee Zheng
Orca Climate Fund

Will Coleman
ReGen Ventures

Claire Veuthey
Rizoma Ventures

Karen Law
Sand Hill Angels

Aaron Cirulnick
Sindia Capital Advisers

Alex Kopelyan
SOSV's IndieBio

Lincoln Bleavans
Stanford University

Patrick Flynn
Switchboard

Ben Vatterott
Telestro Strategy

Isay Acenas
Toyota Ventures Climate Fund

Abbie Strabala
True Wealth Ventures

Maria-Elena Rivero
**US Department of Commerce,
Commercial Service**

Kim DeAllen
Walking Softer

Lauren Xie
Walking Softer



Our 2024 loan recipients - 100% committed to climate change solutions



Enhancing alkalinity in pit lakes for carbon removal.

When open-pit mines are closed they typically fill with water, creating lakes, which can contain leached chemicals and rarely have beneficial uses. Aquarry applies ocean carbon removal techniques to improve the water quality of such lakes, transforming them into largescale, permanent carbon sinks, helping mining companies to turn a liability into an asset.

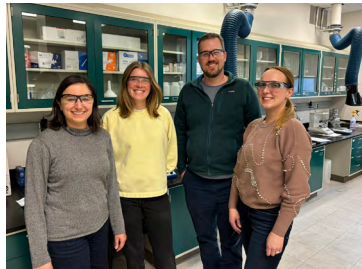
Aquarry's process also reduces the risk of aquifer and stream contamination in the surrounding area and offers the potential for lakes to be used for recreational purposes.

Co-Founded by Kate Murphy PhD (CEO) and Spencer Whitman PhD (CTO), the team estimates that it will directly remove 500 metric tons of CO₂ a year by 2040. "We're planning to address around 2,000 pit lakes over 25 years, beginning in 2027. Experts have identified tens of thousands of such sites globally, with the potential for carbon storage estimated at up to 30 metric tons of CO₂ and three billion dollars of profit per pit lake," said Murphy.

Currently located in Emeryville, California and Denver, Colorado, the company was selected as **Startup of the Year at VERGE 24** and features on **Cleantech's list of 50 Startups to Watch**.

How did we help?

"The loan substantially extended our runway, enabling us to make an additional hire and accelerate our technical development", said Murphy. "The process struck the right balance with respect to diligence. You've curated such a nice community of startups and we're thrilled to be a part of the portfolio."



Smart batteries for use in homes and businesses to help accelerate the clean energy transition.

Chicago-based Blip Energy Co-Founders, Sophia Wennstedt (CEO) and Chance Cobb (COO) have developed a domestic-scale battery with the potential to make a big impact.

"Until now, battery innovation has focused on large systems, permanently installed in single-family homes. But that doesn't work for most of us", said Wennstedt. Blip "unlocks energy equity", enables widespread adoption, provides grid stability, and accelerates the clean energy transition.



"If we connected every window air conditioner in New York to a smart battery we would have more flexible capacity than all the city's fuel-burning power plants combined."

How did we help?

"The loan is incredibly impactful for us as a hardware startup in the early stages of commercialization, and is being used to finalize engineering development and procure components for our first commercial units."



Accelerating decarbonization in existing multifamily buildings.

Cadence OneFive is a SaaS platform that makes climate-responsive construction easy for multifamily, hotel, student, and senior housing. The company's proprietary software, Momentum™, delivers streamlined workflows and project transparency so that users can move fast from planning to construction.

This includes the ability to maximize a portfolio's decarbonization potential, optimize capital allocation, and identify financing opportunities to drive sustainable asset value.

Founded in 2021 by Bomee Jung (CEO) and Marc Zuluaga (CRO), the team expects its software to reduce cumulative emissions by 41 to 88 million metric tons of CO₂ emissions (CO₂e) between 2023 and 2050, contributing to a one-third reduction compared to business-as-usual scenarios. "This impact is critical for achieving a low-carbon future for multifamily buildings," said Jung. "In addition to decarbonization, our goals include improving housing quality, and adaptation/resilience."



Cadence OneFive was one of five finalists in the **Verge Buildings Startup to Watch** awards and won the Urban Future, **Future Vision Prize 2024**.

How did we help?

"Scaling climate solutions, especially in today's challenging investment landscape, requires strategic funding. With the Foundation's support, we are able to expand our engineering and product team's capabilities and further develop design partnerships beyond New York City – a critical step for us to accelerate building decarbonization and create lasting impact. The investment process was transparent, streamlined and fast with excellent communication between the JLL Foundation and our company. It has been a good experience."

Case Study

CL COURAGEOUS LAND

Pioneering large-scale reforestation and conservation through agroforestry.

Brazil-based Courageous Land is on a mission to “reverse climate change while creating health and abundance for all of life on Earth.”



Founded by Philip Kauders (CEO), Gilberto Terra (Head of Agroforestry) and Luiza Avelar (VP Operations) the company helps to unleash agroforestry's potential by reforesting degraded landscapes in a way that maximizes carbon removal and organic crop production. Key products include carbon credits plus premium organic coffee, açai, cocoa, spices, fruits, nuts, beauty ingredients and native hardwoods.

Courageous Land's Agroforestry Intelligence Platform™ provides a turn-key solution to partner farms, easing agroforestry planning, financing, operations and sales.

“Large-scale reforestation and conservation through agroforestry is meeting the growing demand for climate-positive food, ingredients, noble hardwood and carbon credits”, said Kauders. “Our platform helps farmers transform their farm into a profitable source of agroforestry products and carbon, which benefits them, their community and the environment.”

Courageous Land currently has agroforestry hubs in the states of Rio de Janeiro, Bahia, Roraima, and the Vale do Paraíba region of São Paulo, with a total managed area of 500 hectares. “The Vale do Paraíba, once a fertile valley known for coffee cultivation, has endured an ecological crisis of epic proportions,” said Kauders. “Our mission is to revitalize this region, restore its ecological balance and usher in a new era of prosperity.”

How does it work?

As an agroforestry platform, the Courageous Land team works with fellow land stewards to conserve and restore key regions through regenerative agroforestry systems that are optimized for biodiversity, carbon credits, organic production, and community income.

The loan has been transformational, accelerating all aspects of Courageous Land's business.

As Kauders explains, “On one farm, planting began last year with the design, carbon-related financing, and technical assistance provided by Courageous Land. Soon we will help sell the production and carbon credits nationally and internationally.

We've designed our systems to be very flexible. For example, if we're planting coffee, together with the tree species, revenue won't be realized until the coffee plants start to produce after about three years. At the same time, there is an opportunity to make income from the carbon sequestered in the planting, and to attract investors interested in offsetting their carbon footprint so we can often monetize the carbon before we monetize the crops.”

Kauders estimates that each restored hectare can hold approximately 350 tons of carbon. Over the long term, around 12 tons per hectare, per year.

Social and environmental impact

Brazil's rural communities are particularly vulnerable to social and environmental degradation. “They are suffering from inadequate income, limited upward mobility, and overexposure to cancerous agrottoxins,” said Kauders. “This is leading to an aging population of farmers as young rural people flee to cities, invariably landing in favelas (slums). We're making tangible improvements to rural life in three key



ways, providing: 1) participation in future profits to everyone that works with us, plus above-market wages in a fulfilling environment; 2) access to Courageous Land's sales channels and education for local smallholder farmers; and 3) a safe work space with no agrottoxins, as we focus on organic cultivation.”

Courageous Land's work to prioritize job creation and the empowerment of women in all locations forms an important part of its mission. In Roraima, Courageous Land prioritizes the inclusion of Venezuelan refugees as they adapt to Brazil.

To help secure the stability, longevity and expansion of its operations, Courageous Land is creating two training programs: the first, to develop career paths for entry-level employees, which encourages them to reach director level; the second is a program to certify third-party specialists who can represent the platform in different regions of Brazil and potentially other countries. “Once individuals are properly

trained and certified, they can be matched to landowners who want to engage in agroforestry. We see this as a highly effective way of scaling our business and for the expansion of agroforestry, which is to everyone's benefit.”

Courageous Land plans to donate 1% of all food grown to nourish Brazilians that are going hungry, particularly children. In addition, it will facilitate the planting of perennial fruit and nut trees on smallholder land to help provide permanent food security. “We strongly believe in the cultural and ancestral value of agriculture, and agroforestry in particular. The planet needs new regenerative farmers.”

How did we help?

“The loan has been absolutely transformational,” said Kauders. “We have a fantastic team, a fantastic vision, and we were already executing well but this loan provided us with the capital we needed to accelerate our impact, grow our business and attract co-investors.”

The loan has been used to accelerate all aspects of Courageous Land's business, including technological development, fieldwork, pilot programs and preparation for scale. “The development of our platform is pivotal to the way in which we stay organized, take on new partnerships with landowners, and sell the crops, carbon and timber into the marketplace.”

Courageous Land is creating habitat for biodiversity, healthy food for consumers, and improving the lives of people working in rural areas.

“Our platform helps farmers transform their farm into a profitable source of agroforestry products and carbon credits, which benefits them, their community and the environment.”

Philip Kauders
Co-Founder and CEO



Speeding the transition to a renewable energy economy.

Cosmic Robotics automates the most labor-intensive aspects of solar construction, unlocking the potential to scale production to unprecedented levels.

Solar energy has become one of the most cost-effective forms of power generation, with demand soaring. The primary obstacle to installation lies in labor logistics and bandwidth.

Founded by James Emerick (CEO) and Lewis Jones (CTO), Cosmic Robotics' technology can take a project requiring a three to five person crew to build 300-450 modules a day and instead build 800-1,000 modules a day with one operator. "Our technology offers the opportunity to increase the speed of deployment, automating labor for a more seamless solar farm installation," said Emerick.



The team has long-term ambitions to expand their presence to space. "We are helping to create energy abundance here on Earth, while developing foundational technologies that know no bounds."

How did we help?

"The JLL Foundation loan has allowed us to extend our runway and prepare for future deployments on the Cosmic-1A autonomous solar panel installation system. The first Cosmic-1A helped install 5KW of solar panels. In 2025, we expect to install 2MW of solar panels. By 2030, we expect the Cosmic-1A platform to help install 10GW of utility-scale solar. The loan has also bolstered the excitement from existing investors and we believe it will be viewed positively by new investors when we next fundraise. The process was easily the smoothest and most efficient investment process we have gone through to date. It has been a pleasure getting to know and working with the team."



DaisyChain

Decarbonization and electrification services to multi-unit buildings.

DaisyChain Energy finances, installs and manages clean energy upgrades to ensure that buildings operate efficiently with its proprietary software platform.

Co-founded in 2024 by Alex Blumberg (CEO), Mcgowan Southworth, Bob Currie, and Amit Singh, and based in Brooklyn, New York, the company enables property owners to achieve sustainability goals without upfront costs or operational burdens. "In most buildings, utility companies issue bills to each resident", said Blumberg. DaisyChain replaces the utility inside a building, tracking usage and billing residents. They continue to pay the same residential rate they would have paid the utility while we pay the bill, which is calculated based on a lower, commercial rate. The difference between this lower commercial rate and the residential rate allows DaisyChain to pay for building upgrades while still operating profitably."

Daisy Chain finances up to 100% of the cost of installing upgrades – from solar panels and hot water heat pumps to EV chargers. The service offers tax benefits too. "Many green infrastructure upgrades come with tax incentives/abatements. We pass those tax savings on to customers, helping them make money on their buildings and partially or entirely eliminate LL97 fines that are set to kick in over the coming years."



How did we help?

"We plan to use the JLL Foundation loan as seed capital for project financing. The money will help us build milestone projects. These projects will demonstrate our control system's capability to integrate electrification technologies in a cost-effective manner."



Recycling plastic waste while creating job opportunities for marginalized people in Uganda.

With no formal waste collection services, the disposal of plastic waste is one of Uganda's biggest challenges. Over 600 tons of plastic is disposed of every day, with more than 90% of it ending up in unsafe landfills or being burnt.

Eco Brixx pays for each kilogram of plastic that Ugandan communities deliver, recycling plastic while creating job opportunities for vulnerable groups, including people with disabilities, women, and young people. To date, the company's environmental and social impact includes 1,546 tons of plastic recycled, 65 million 500ml plastic bottles recycled, and income opportunities for 4,615 people.

Founded in 2018 by Andy Bownds (CEO), Fr. James Sendege (NGO Board Member), and Gee Elliott (NGO Board Member), Eco Brixx has been certified by **Climate Stewards** to be carbon negative. "Their findings proved that for every ton of plastic Eco Brixx recycles, 1.5 tons of GHG emissions are prevented from entering the atmosphere.

With 130 tons of waste recovered every month, Eco Brixx is currently preventing 195 tons of GHG emissions," said Bownds.

How did we help?

"The JLL Foundation loan enabled us to increase our revenue by over 100% by increasing our production capacity and developing new product lines. This led to us recycling 130 tons of plastic a month in October 2024 – an increase of over 100 tons from this time in 2023. It has allowed us to increase our impact with more people earning through our recycling network and increase our staff team to 64. It has been incredibly beneficial to Eco Brixx and the community and environment at large."



Case Study



Carbon capture technology through an algae-based coating.



Cyanoskin is a cutting-edge carbon capture technology that transforms buildings into CO2-absorbing structures using an algae-based coating, actively reducing emissions and addressing urban pollution.

Founded in 2023, the company is a female-led interdisciplinary team collaboration between the Royal College of Art and Imperial College London comprising biomaterials designer Emma Money (Co-Founder, CEO and CTO), businesswoman Antionette Nothomb (Co-Founder and COO), working with a small team of scientists and software and hardware engineers.

“By 2050, over 68% of the world’s population will live in urban areas, leading to increased pollution and carbon emissions. Carbon capture, utilization and storage uptake need to grow 120 times by 2050 for countries to achieve their net-zero commitments,” said Money. “With our affordable and effective approach, Cyanoskin accelerates the transition to net zero and helps building owners stay on track with their carbon budget. Our goal is to utilize the ever-expanding surface area of cities and transform them into the lungs of the earth.”

Our goal is to utilize the ever-expanding surface area of cities and transform them into the lungs of the earth.

Calculations show that the algae utilized within the coating is able to biofix up to 50 times more carbon than plants. “When applied to buildings, our solution not only captures significant amounts of CO2 with ease but also releases oxygen, making it particularly impactful in highly polluted areas such as cities or industrial zones. Coating buildings and warehouses in major cities could reduce total global emissions by 18% annually.”

How does it work?

The coating is self-sustaining, containing a proprietary nutrient formula to initiate growth, with the remaining elements sourced from the air. Cyanoskin is also developing an in-house adapted carbon sensor, which will capture data to sell to building owners. This sensor uses variations in pigmentation and concentration to precisely measure algal growth and absorption levels.

How did we help?

“We plan to use the funds within our R&D processes to enable the technology we are developing without incurring a financial burden that could set us off track. Commercial availability is scheduled for 2026. We expect to expand into Europe from our current base in the United Kingdom. Europe’s stricter carbon emission regulations create a strong market opportunity due to governmental financial pressure for compliance. We are also exploring partnerships in Japan and Canada. Having such a large corporation supporting us has not only attracted funders but also fostered trust among our customers and investors.”

“We are two women co-founders leading this company. We were proud to win Imperial College London’s Startup of the Year award and have also secured a UK government grant to advance our mission.”

Emma Money

Co-Founder, CEO, CTO

Antionette Nothomb

Co-Founder, COO

Calculations show that the algae utilized within the coating is able to biofix up to 50 times more carbon than plants.

InventWood

Harnessing the strength of cellulose.

Super light, super strong and naturally beautiful, InventWood's debut product, SuperWood, empowers builders to create extraordinary buildings with reduced costs and construction times, replacing steel and storing carbon in the process.

Every part of InventWood's value chain contributes to a more sustainable way to build, from how wood is sourced to how SuperWood is created. "Our goal is to reshape the world, regenerate forests and slash gigatons of carbon emissions," said CEO Tyler Huggins. "InventWood is delivering an end-to-end, vertically and naturally integrated solution that results in carbon-negative construction, from cradle to regeneration."

The business was founded in 2016 by Amy Gong PhD (Chief Science Officer) and



Liangbing Hu PhD. Based in Maryland, USA, InventWood's high-performance, cost-effective products are made from renewable resources, including abundant, fast-growing, and invasive species, offering both flexibility and resource efficiency.

"We expect to offset 350 metric tons of CO₂e per year by deploying the SuperWood made in our pilot manufacturing facility in cladding/facades, flooring, and decking market segments. If SuperWood were widely deployed as a replacement for steel and aluminum, the impact could be at least two gigatons of CO₂e per year," said Huggins.

How did we help?

"The JLL Foundation loan extended our runway allowing us to prove out technology and market demand. It also helped to attract other investment."



Redefining the plastic value chain, making non-recyclable plastic waste circular.

In the United States, only 5% to 6% of plastics are recycled each year. Novoloop transforms hard-to-recycle plastics into useful materials with a small carbon footprint.

Headquartered in Menlo Park, California, the company was founded in 2015 by Miranda Wang (CEO) and Jenny Yeo (COO). "At current production rates of over 300 million metric tons per year, there will be more plastic in the ocean than fish by 2050. Very little of post-consumer polyethylene is ever recycled," says Wang. Novoloop works with partners in the waste recovery and recycling value chain to source polyethylene waste, which is the starting material for Novoloop's Lifecycled™ products. "We chemically alter the post-consumer polyethylene to create building blocks, which we use to make thermoplastic polyurethane (TPU). This reduces carbon emissions by up to 41% compared to traditional methods."

Novoloop's pilot plant in Surat, India, was completed in March 2024, in collaboration with chemicals manufacturer Aether Industries. "After years of research, development, and engineering, our pilot plant is successfully making available the first lots of Lifecycled™ products to the world."



How did we help?

"The JLL Foundation loan allowed us to continue work on our demonstration plant, which was crucial for our scale-up and one of the factors that attracted investors." Novoloop is pursuing its global expansion strategy, building teams in Europe (sales, marketing, compliance) and China (application development, supply chain). "We are very grateful to have received this funding at a time when the venture capital market was challenging. It helped us demonstrate more progress, which attracted other funders. Since then, we are proud to have been recognized on the Norrskan **Impact/100** list of the world's most promising impact startups." Novoloop repaid their JLL Foundation loan in December 2024.

Ouros Materials

Commercializing carbon-negative building materials.

Ouros Materials' mission is to decarbonize the built environment by manufacturing low-cost, high-performance, carbon-negative building materials.

Founded in 2023 by Teresa Liu (CEO) and Sharon Tracy, PhD (CTO), and headquartered in New York, this early stage company is targeting a final carbon footprint of less than 0.1kg of CO₂e per kg of material produced, which is more than 90% less CO₂e compared to incumbent wood-like composite materials.

"With CO₂ emissions from the lifecycle of building materials responsible for 11% of GHG emissions, and as demand continues to grow, less carbon-intensive methods of constructing our buildings are vital to a more sustainable future. Our proprietary process allows us to not only store CO₂ in our material but also operate at low temperatures powered with renewable energy. This gives our materials ultra-low carbon footprints that reach below zero emissions. Our material is recyclable, low-cost, strong, tough, crack-resistant, and durable," said Liu.

How did we help?

"We are using this initial catalytic funding to scale up our carbon-utilizing materials technology and spin out of Rutgers

University, where it was invented. Our focus is to turn these material samples into building material product MVPs, which will be crucial for customer interviews, securing pilot agreements, achieving our first small-scale revenue, and proving product market fit. These funds support our operations by covering our team's salaries, our ability to hire and stand up initial R&D and product development at our partner facility, and work with contract manufacturers to achieve this scale-up," said Liu. "The process was incredibly straightforward, streamlined and quick. We are grateful for the belief shown in us early in our journey."





Case Study

MYCOCYCLE

Mycocycle's patent-pending process improves the natural functions of fungi to transform construction waste into low-carbon raw materials for the built environment.

By 2030, the construction industry is projected to be more than twice the size it was in 2020, underscoring the urgency for scalable, circular, waste-diverting solutions.

Mycocycle is at the forefront of decarbonization and waste management innovation, transforming industrial waste into new low-embodied raw materials.

Since it was founded in 2018 by Joanne Rodriguez (CEO), Illinois-based Mycocycle has treated 65,000 pounds of material via paid pilots with customers across the waste management, recycling and manufacturing sectors, and with building owners and contractors.

How does it work?

Fungi are natural cleaners and builders. Their mycelial networks are highly efficient, reducing the toxicity of materials while transforming them, via biosorption, bioconversion and biodegradation. Their mycelium is made of a naturally occurring material that is fire and water resistant, insulative, durable and light weight – an ideal material for the manufacturing of acoustic tile, flooring, concrete, walls and insulation.

Mycocycle's three-step process begins at the point of waste generation by manufacturers on site.

Step 1: Waste Management

Including asphalt shingles, crumb rubber, gypsum board/fines, insulation, textiles. We leverage our containerized solution, MYCOnainer™ (pictured – a mobile bioprocessor designed to decentralize waste processing) to ensure toxic waste is processed in a climate-controlled environment. Duration: One week



Impact

Mycocycle's GHG footprint is estimated at 80-85% lower on average than competing products. Manufacturing processes are responsible for between 55% and 63% of Mycocycle's GHG footprints, the majority of which (>99.9%) is due to electricity used within the production process. For example, if wind power were utilized to meet all electricity needs for the production of MycoFILL™-G, the resulting GHG footprint could be reduced by almost 63% down to approximately 0.348 kg CO2e per kg product. "This far outweighs the cost to the environment of sourcing virgin materials

Step 2: Mycocycle Process

Treatment is applied within controlled conditions (in situ, ex situ, or micro-process site). Duration: Approximately two weeks to reduce toxins and create a harvestable raw material.



from nature and addresses some of the world's hardest to treat toxic constituents created from plastics and petrochemicals. Even without using green energy, our manufacturing values will go way down as we get more efficient and produce more material over which to spread our energy usage. This will make a dramatic difference at scale," said Rodriguez.

Mycocycle's growth strategy will see the team raise a series A equity round in Q1 of 2025. That funding will support the mobilization of a 10,000 square foot facility in Georgia, which would expand its

Step 3: New Products

MycoFIBER™
MycoFILL™
MycoFOAM™
These products replace the need to extract virgin raw materials from nature as well as plastic polymers, while offering a low-embodied carbon alternative for the industry. Duration: One to two weeks.



capacity to treat over three million pounds of waste annually, and the expansion of the pilot facility in Illinois to operate in 2026, which would treat over six million pounds annually.

The strategy will continue to position the business in the built environment while moving them further up the supply chain.

"We can replace plastics with our bio-based alternatives so our potential for expansion is on a global scale. Working with plastics compounders allows us to move into the automotive and consumer packaged goods

Mycocycle Founder and CEO, Joanne Rodriguez, is proud to lead a multicultural company. Half the leadership team is female and across the entire team, over 60% of the employees are women or from multicultural backgrounds.

sectors and create high volume throughput for the raw materials."

By way of example, Mycocycle is currently testing its ability to replace Nylon 6, a synthetic polymer used in a very wide variety of industries for its strength, durability, and heat resistance, and has started a commercial project for sports fields, replacing SBR crumb rubber with MycoFILL™ C product.

How did we help?

The JLL Foundation loan is being allocated to the development of Mycocycle's next generation MYCOnainer™, including engineering studies, implementation of a scale down unit, and upgrade of the current version.

The container upgrades will enable the team to move from a batch to automated process to improve material recycling rates. "We are beginning to scale and ready to leverage mushrooms across the nation's waste and building materials sectors. This will reduce emissions in two of the heaviest-polluting industries and transform waste to resources."

"We are interested in corporate venture capital that could lead to future partnerships with for example, building materials manufacturers or end of life tire rubber recycling. Decarbonization funds are a good fit too. They understand the

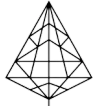
environmental impact Mycocycle is making and the high growth potential we offer."

Mycocycle's transformative process drives circularity in the construction supply chain, diverts waste from landfills, and reduces the need to extract new virgin materials from nature.



"We're primed to leverage mushrooms, the planet's recyclers, across the nation's waste and building materials sectors to reduce emissions in two of the heaviest-polluting industries and transform waste to resources."

Joanne Rodriguez
Founder and CEO



PHYTO STONE
MATERIALS

Biochar-enriched tiles for carbon sequestration in the built environment.

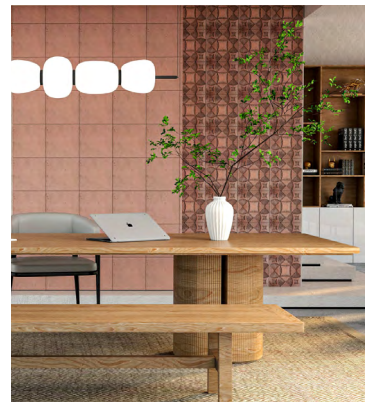
PHYTOSTONE is a woman-owned studio that develops novel and advanced natural building materials.

The company's flagship product, Cast Carbon, is a biochar-enriched interior wall tile. The tiles sequester 10kg of CO₂e per m² of surfacing through plant-based carbon content, enabling renovation according to 21st century sensibilities – material health, carbon sequestration and differentiating aesthetics embedded in a single tile. They also offer zero waste at end of life, as they can be returned to the earth as a fertilizing soil amendment.

Supported by the National Science Foundation, NYSERDA and JLL Foundation, Cast Carbon has been rigorously tested as a Class A fire-proof material, proving that biobased materials can excel across imperatives, from safety to beauty, carbon negativity and circularity.

How did we help?

The JLL Foundation loan is helping PHYTOSTONE establish a manufacturing base in Brooklyn, NY where localized production can service the NYC built world as a beachhead market.



The funding is supporting the purchase of a hydraulic tile press, IP protection and tile production for a pilot at Governors Island.

“We are so grateful for not only having the JLL Foundation’s financial support, but also for the opportunity to learn from JLL’s deep and broad industry expertise, which is so enriching for the commercialization journey. 2024 marked the 200 year anniversary of the patenting of Ordinary Portland Cement, a material innovation that reshaped the modern world. We are excited to have this partnership towards accelerating new materials that meet the demands of the 21st century like elevating material health, zero waste, contact with nature, etc. We can’t imagine a better partner in promoting these ideals than JLL,” said Emily Majewski, Co-Founder.



Scalable urban greening technologies.

Plantaer is “creating a seamless connection between architecture and nature” creating low-cost, zero-maintenance green roofs and walls through the development of new materials and data collection systems that integrate plant life directly on surfaces of buildings and roads.

Co-founded in 2023 by Manuel Benitez Ruiz and Robert Abdallah, and based in New York City, Plantaer’s climate-impacting technology can be applied to roofing tiles, roof pavers, architectural panels, coatings, planters, sculptures and other exterior structures. “Our team is on a mission to green every surface of the built environment by detoxifying the materials used and enabling them to actively interact with nature, starting with concrete”, said Ruiz.

How did we help?

The JLL Foundation provided catalyst funding to fast-track the development and go-to-market timeline for Plantaer’s first advanced system. This innovative solution has the potential to reduce over 80% of the lifetime costs of traditional green living infrastructure. It marks the company’s first step toward delivering impactful solutions for stakeholders, addressing urban challenges such as urban heat islands, toxic air quality, and stormwater runoff.



Sustainable transportation, energy generation and storage.

Solarbox is an electric mobility and energy company providing a sustainable transportation and energy solution for the African market.

The company offers locally assembled utility electric vehicles (EV) such as motorbikes and tuk-tuks, and solar-powered charging stations, enabling customers to dramatically reduce transportation fuel costs and carbon emissions. Solarbox harnesses energy from solar panels while also being integrated with the electricity grid to enhance performance. Currently deployed in areas with reliable grids, Solarbox has potential in any region with weak, unreliable, and non-existent grids.

Founded in 2022 by Tijan Watt (CEO) and headquartered in Dakar, Senegal, Solarbox is responding to the rising demand for eco-friendly energy and mobility.

“Rapid urbanization and economic growth have led to a surge in vehicular emissions,” said Watt. “The increasing number of vehicles, coupled with outdated vehicle technologies and inadequate emission control measures, have contributed to elevated levels of air pollution. Solarbox is the first to install a network of charging stations in Senegal. With a fleet size of 400 vehicles and 10 Solarbox installations, we

anticipate saving an estimated 8,000 tons of carbon emissions, making a substantial positive impact on the environment.”

How did we help?

“The JLL Foundation loan will contribute to three activities: increasing our B2B vehicle fleet; development for the ride-hailing company Heetch, for which we will supply charging stations for an EV fleet; and the launch of a carbon program in association with Allcot, a certified carbon developer, to develop digital methods for carbon collection and automated credit tokenized generation.”



Case Study



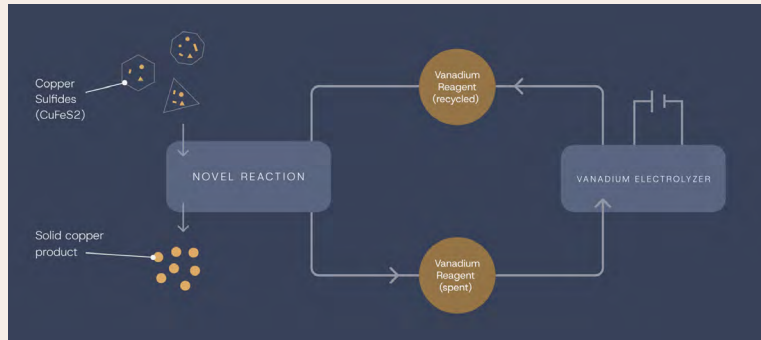
STILL BRIGHT

Accelerating the green transition through a more complete recovery of copper using a renewable energy alternative to smelting.

Still Bright is revolutionizing copper production with a patented electrochemical process that replaces smelting with a more efficient and sustainable alternative.

Founded in 2022 by Jon Vardner (CTO), Prof. Alan C. West (Chief Scientist) and Prof. Scott Banta, Still Bright's process at full scale will produce 1,000 tons of copper per day to extend availability for several decades in response to substantial, increased demand. "To reach net zero by 2050, the world needs to produce as much copper in the next 26 years as it has produced in all of human history. Clean energy technologies, such as wind energy, solar energy, and electric vehicles require two to five times as much copper as their traditional counterparts," said Vardner. "However, the high costs associated with the mining, concentrating, and processing of copper ore mean it is likely to be in short supply. New technologies are vital if we are to sustainably provide cheap copper refined domestically rather than produced by smelting overseas."

Currently, 80% of copper is produced by smelting, which is environmentally damaging, highly regulated, fossil fuel dependent, and high in capital costs. The majority of smelting is carried out in China. Copper concentrate is shipped globally from mine sites to be processed in China, and refined copper is then shipped to



where it is needed for use – a costly and energy-intensive supply chain. In addition to boosting the domestic production of copper and reducing risks in the supply chain, Still Bright's process will reduce the amount of energy used to transport concentrated copper ore overseas. It will also expand processing to currently nonviable feedstocks, improve the recovery of critical materials, and prevent the release of environmentally deleterious byproducts.

"The biggest climate impact is the avoidance of toxic pollutants, such as arsenic dust and sulfur dioxide inherent in smelting production," said Vardner. "Still Bright's copper extraction process is significantly lower in CO2 emissions and energy use compared to current copper extraction methods."

How does it work?

The patented hydrometallurgical process originally developed by the Still Bright leadership team at Columbia University, leverages a novel reducing agent to enable the rapid conversion of concentrated copper ore into refined copper at room temperature and pressure. The process then utilizes electrochemical technologies to continuously recycle the reagent, driving cost savings and sustainability. As a result, refineries can produce large quantities of copper while reducing dependency on smelting, reducing costs, and avoiding pollutants typically associated with smelting.

In addition to replacing smelting to produce copper from high-grade chalcopyrite, Still Bright expands copper production to currently nonviable resources, requires significantly lower capital expenditure than

smelting and can be integrated directly at mine sites to onshore production with renewable power.

Still Bright is revolutionizing the copper industry, enabling domestic, sustainable, and complete extraction of copper from concentrated ore in minutes. Its Rapid And Complete Electrochemical Reduction (RACER) technology unlocks the clean copper needed to transition to clean energy while providing significant cost and emissions savings.

How did we help?

"The JLL Foundation loan helped us extend our runway, purchase equipment and supplies, and support our current team's lab-scale R&D towards the end of our



fundraise. It gave us fast access to capital in an uncertain investment environment just when we needed it," said Vardner.

Headquartered in Newark, New Jersey, Still Bright currently operates in the US only, "but we've tested feedstocks from all over the world, and plan to address the global market in due course," said Vardner.

The company has already made its mark on the global stage as winners of the **World Economic Forum/Uplink Sustainable Mining Challenge 2024**.

"New technologies are vital if we are to meet growing demand for copper in the face of declining quality of raw materials. Even more difficult is to do so sustainably, affordably, and domestically rather than the industry standard of producing copper by smelting overseas."

Jon Vardner
Co-Founder and CTO

Case Study



Using robotics and AI to reclaim lumber for reuse, reducing waste and promoting circular practices.



Urban Machine is set to transform the construction industry by salvaging millions of tons of wood waste for reuse. Its robotic solution removes metal fasteners from construction and demolition lumber waste, reclaiming it for premium wood products.

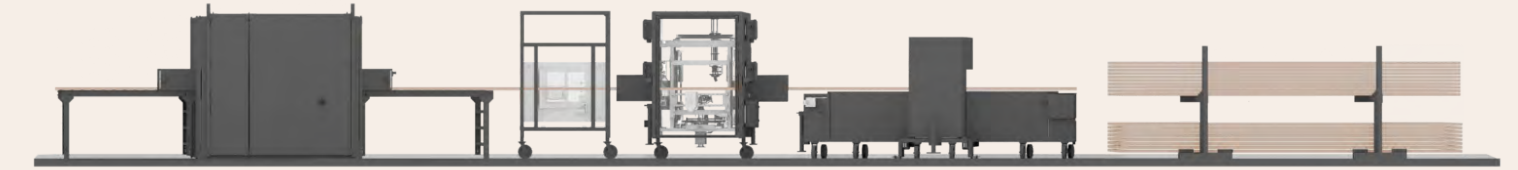
Based in Oakland, California, Urban Machine was founded in 2021 by Eric Law (CEO), Alex Thiele (LSE), and Andrew Gillies (CTO) – a dream team that combines a passion for sustainability with tech solutions to global challenges. With more than 37 million tons of wood waste from construction and demolition going into landfills each year in the US alone – about half of what is harvested each year – Urban

Machine's compelling solution delivers economic and environmental benefits.

"Technology was a barrier preventing wood from being reused," said Law. "The breakthroughs in the robotics community, such as computer vision and AI algorithms, have made what we're now doing at Urban Machine possible. The repetitive process of removing metal from lumber a thousand times a day is too laborious a task for humans but a perfect application for robots."

How does it work?

Lumber is fed into the machine which uses high speed gantries and AI vision systems to locate metal fasteners. Its patented end



Urban Machine's processing line is almost 120 feet long and 30 feet wide. Four different robot arms move around each other in order to pick the lumber free of metal nails and other fasteners.

effectors remove nails, staples and screws. The lumber is then passed through a metal detector to ensure that it is metal free and ready for new construction.

Wood waste is typically ground up and buried in landfills or sold as a low-quality product. Urban Machine offers an opportunity to return lumber to the built environment. Using the machine lowers the cost of reclaimed lumber processing to compete with virgin lumber pricing, reduces landfill, transportation, and carbon emissions.

The high-grade, dimensional wood that is reclaimed is a premium product of a higher quality than virgin, prized for its hardness, straightness, and tight grains.

Social and environmental impact

Urban Machine's process is also low on energy usage. "One fact that people find really surprising about our system is that it uses one tenth the amount of energy as virgin lumber," said Law. "We're also building robots without replacing people's jobs. In fact we're creating jobs with our robots, which is a big challenge for most other robotics companies. For us, it's a huge win."

There is a significant economic incentive for users to divert waste lumber from landfill and give it to Urban Machine for recycling. "It saves them paying tipping fees to landfill

– they give it to us for free. Reclaimed lumber can then be sold back into the lumber ecosystem at a much higher value. Woodchips are typically given away or sold for up to 25 dollars per ton, reclaimed lumber is 200 to 2,000 dollars a ton. And of course ours is a much more sustainable solution," said Law.

Research shows that cumulative energy consumed in producing virgin compared to reclaimed framing lumber and wood flooring was about 11 and 13 times greater, respectively. Global warming potential was about three and five times greater, respectively.

During growth, wood absorbs one ton of carbon per cubic meter. By keeping the same timber in circulation, it avoids releasing CO2 into the atmosphere. "People want healthy, sustainable buildings and developers want price certainty on building materials. Reclaimed lumber delivers both



while reducing the impact of deforestation and keeping valuable resources from being sent to landfill."

How did we help?

The team at Urban Machine found the JLL Foundation process "really smooth and straight forward". "The loan allows us to continue to improve our systems throughput in reaching our goal of economic parity with virgin lumber," said Law. "We are on track to deliver the machine to our first customers in 2025. We hope to continue attracting investors with building products and waste industry connections and a focus on sustainability who can help us reach our goal to have machines deployed around the world."

"People want healthy, sustainable buildings and developers want price certainty on building materials. Reclaimed lumber delivers both while reducing the impact of deforestation and keeping valuable resources from being sent to landfill."

Eric Law
Co-Founder and CEO

Our 2023 and 2022 loan recipients - where are they now?



Climate risk management and advisory services to asset managers and corporations.

Co-founded in 2019 by Gautam Bakshi (CEO), and based in Toronto, Ontario, 15Rock “contextualizes climate goals by aligning to multiple frameworks, employing cutting-edge machine learning/ financial engineering to highlight the ROI that climate-related projects can offer to organizations and investors,” said Bakshi.

2023 saw 15Rock receive the prestigious **Globe and Mail Changemaker Award**. In 2024, the company worked with numerous largescale, global investment funds to model and build transition plans for companies including those in the aviation, energy and tech sectors. “Our work has reached the top levels of an organization, showing them the ROI of climate-friendly projects”, said Bakshi.

The team remain focused on expanding 15Rock’s offerings to guide corporations in their pursuit of climate-friendly decisions and environmentally conscious investments.

The JLL Foundation people and the process have been wonderful.



Providing agricultural and energy access solutions to off-grid farming communities across the world.

Agsol’s solar powered (and grid-compatible) agro-processing mills are a green alternative to diesel-powered machines offering a sustainable solution for the world’s poorest farmers and families. Based in Kenya, Agsol was co-founded by CEO Matt Carr in 2016.

The JLL Foundation loan helped Agsol achieve key milestones in 2023, including product refinements in preparation for mass production, and the establishment of its own factory in China, marking a crucial step towards commercialization.

2024 has been a year of growth.

“We successfully completed two scaled production runs from our new mass production factory in China, marking the beginning of our transition into scaled production and sales/distribution”, said Carr.

“The JLL Foundation loan helped attract other investors, which has been important given that capital is our biggest handbrake and the investment climate for social impact companies like Agsol is difficult.”



An innovation lab for green technologies used in urban spaces, including solutions for green walls and green roofs.

In 2024, Athens based Babylon Gardens continued promoting the importance of green roofs and green walls to increase climate resilience, and the use of nature-based solutions for climate adaptation and nature-positive approaches to cities and the built environment.

Projects included the installation of a pilot green roof for the Technical University of Crete; subsequent monitoring of the installation process to assess growth and effects on ambient temperature, humidity retention, rainwater run-off, and presence of biodiversity (bird and insects) in the previously barren space; the development of a technical paper on the benefits of the green roof; and a study for a nature-based landscaping project on the island of Serifos, Greece, at the premises of a private villa.

“We are continuing to provide support and training to the group of students involved in the university project, and material for raising awareness within the university community. 2024 has been another challenging year but our belief in Babylon Gardens remains strong and we hope to continue our efforts,” said Co-Founder and Managing Director Christina Deligianni.



Reducing climate impacts of fast fashion.

Biorestore manufactures the world’s first patent pending bio-based laundry additive that restores worn and used garments. In 2023, Biorestore founders, Wajahat Hussain, Ali Qamar and Richard Toon, said “the JLL Foundation came at a critical time. It helped us with the fulfilment of initial purchase orders, in expanding the team, and building the direct-to-consumer business. We launched several collaborations with fashion brands within the Nordic region and exhibited at the Textile Exchange Conference 2023 where we were able to meet even more brands.”

We expanded from a team of three to eight and added four more chemistries to our portfolio.

Since then, the company has expanded its direct-to-consumer and wholesale business from its base in Stockholm across the EU, UK and US.

In 2024, Biorestore successfully launched an industrial restoration pilot with Uniqlo Japan at two locations. “We expanded from a team of three to eight and added four more chemistries to our portfolio, which help address different issues that hinder the longevity of apparel.”



CARBONWAVE

Alumni

Converting seaweed into carbon saving materials.

Puerto Rico based Carbonwave turns Sargassum seaweed into materials that can restore soils and oceans, eliminate microplastic waste and achieve carbon neutrality. Its proprietary approach aims to strengthen the ability of soils and oceans to function as natural carbon sinks, while restoring their capacity to generate life as critical habitats, fishing grounds or farmland.

Founded in 2020 by Geoff Chapin (CEO), in June 2022, Carbonwave was chosen as a **Top Innovator** for the **World Economic Forum’s UpLink Program**. The company has repaid the zero-interest loan from the Foundation and since received and repaid a further loan in 2023.

Sales doubled again.

2024 saw Carbonwave win a place on **Fast Company’s list of Most Innovative Companies**, including being number six in agriculture. They also won **Best Individual Offsetting Project** from the prestigious **Environmental Finance**. “We saw our cosmetic emulsifier get integrated into 20 end products with another 48 being launched or in planning. Our biostimulant sales doubled again on the strength of strong yield increases and 5-10x ROI for farmers. We are on track to close an oversubscribed Series B in Q1 of 2025.”



Increasing recycling rates using software and data.

CIRT is a women-owned, award-winning B-Corp leveraging software and data to help companies decarbonize their packaging and advance circular economy goals. Based in Athens, Georgia, co-founders Dr Jenna Jambeck and Katherine Shayne commercialized the platform in 2021. CIRT Check™ seamlessly integrates with clients’ existing systems, while ensuring compliance with evolving regulations, making it the trusted choice for responsible brands.

2024 was a pivotal year.

“2024 was a pivotal year for CIRT,” said Shayne. CIRT launched SmartLabel® integration, eliminating the need for additional on-pack real estate, costly retooling and reprinting, and began its partnership with the Consumer Brands Association, becoming the preferred software provider of recycling and circular packaging data. Kat Shayne attended Summer Davos with the World Economic Forum in Dalian, China where she spoke about the Global Plastics Treaty and its connection to CIRT, and was a member of the Villars Institutes esteemed guests, where she has been invited back to speak on the circular economy. Dr Jenna Jambeck received the 2023-24 SEC Professor of the year award out of 14,000 tenured full-time professors, as well as being a MacArthur Fellow and Genius Grant recipient.



Transforming ordinary paper into eco packaging through green chemistry.

Folia Materials is replacing plastic with recyclable, paper-based products, which offer low-cost universal access to clean drinking water and food packaging. Co-founders Jonathan Levine PhD (CEO) and Theresa Dankovich PhD (CTO) expect to help reduce the production of 1.3 billion units of plastic packaging, 115,000 tons of carbon, and support 500 million people with clean, filtered water over a five-year period.

“The loan from the JLL Foundation in 2023 allowed us to keep pushing operations and gave us time to close another development check from our anchor client. With very lengthy commercial sales timelines, this really helped us get to the next phase in our product development.

Our focus in 2024 has been on fundraising and growth.

One of the biggest challenges we face is finding qualified investors with knowledge of our space,” said Levine. “We are continuing to prioritise fundraising and sales.”

FORESTED

Creating and strengthening natural ingredient supply chains.

Founded by Ariana Day Yuen (CEO), Forested used their JLL Foundation loan in 2023 to stay afloat during a challenging fundraising market. “It enabled us to grow and continue building our track record,” said Yeun. “It was the most seamless process I have ever gone through.”

2024 has been transformative.

“In 2024 Forested supported the protection of 58,788 hectares of intact biodiverse forests in Ethiopia via our work to strengthen forest honey supply chains with community-led conservation groups. We expanded beyond our operations, working with more than 1,000 smallholders in Ethiopia to produce honey, and more than 2,000 additional land stewards in Kenya and Uganda, building supply chains of regenerative essential and carrier oils and shea butter.

We also launched our innovation project with **The Nature Conservancy** to assess the viability of carbon insetting as a value unlock for smallholders along Kenya’s coast – and it is viable! Our next seed fundraising round of USD1.5m launches in February 2025.”



Making affordable electric vehicle charging stations accessible.

GoPowerEV delivers an affordable, hassle-free solution for property owners and residents, which is estimated to cost 70% less than legacy alternatives, and in most cases does not require a utility upgrade.

The company expects to remove approximately 20 metric tons of CO2 for every EV that it enables over a five-year period. Founded by John Reister (CEO) in 2019 and headquartered in Palo Alto, California, GoPowerEV has partnerships with utilities and agencies across the Bay Area and southern California.

The JLL Foundation loan was used to fund our ongoing operational development. We have since gained slow but steady traction.

“We won several contracts with the California Energy Commission for implementing charging in affordable housing, and to improve energy management, and now have about 40 residents of multi-family apartment buildings charging electric vehicles at home.”



Reinventing heating, ventilation and air conditioning systems for a net-zero future.

Founded in 2020 by David Goldstein (CEO) and headquartered in New York, Hydronic Shell offers a solution for buildings of whatever shape, size or use in cities around the world. “2023 was a year of huge progress for us. We made significant advances with prototyping and testing, and thanks to the JLL Foundation, secured additional grant funding.

In 2024, we made major progress with our technology development and pilot preparation.

We received a cash prize from the New York State Energy Research and Development Authority, and another from the US Department of Energy thanks to prototyping work we were able to complete using the JLL Foundation loan.

We also received a grant from the US Department of Energy. We plan to close our next funding round in early 2026,” said Goldstein.



Eliminating single-use plastics through a closed-loop beverage vending system.

Founded in 2020 by Manuela Zoninsein (CEO), Kadeya has created the world’s first closed-loop beverage system. The JLL Foundation loan was used to fund the development of Kadeya’s first fully autonomous unit, which was completed in March 2024.

2024 has been an amazing year. We made immense progress on commercializing our product, exceeding our sales goals, and lining up terms on our first priced round.

“In terms of impact, we saved around 3,000 single use PET bottles from being consumed”, said Zoninsein.

“We also completed the **LARTA Climate Fellowship** and are proud that Kadeya is a finalist for the **Self Service Innovation Summit's Innovation Award**.”



Supplying affordable, reconfigurable, sustainable housing interiors.

Co-founded by Armelle Coutant and Candice Delamarre, Kit Switch launched its first product line, the Kit-Kitchen in November 2022. “2024 was a year of achieving proof of concept, demonstrating technical feasibility, and setting Kit Switch up for success in scaling,” said Coutant.

“The JLL Foundation loan in 2022 enabled us to build on our first prototypes and to showcase full-scale prototypes at various trade shows. In 2023, we officially commercialized and launched our first product line and secured a series of paid pilots.

2024 marked our transition from small-scale pilots to large-scale deliveries. We delivered eight installations across California. This led to agreements for the design phase of 240 apartment units. We expanded our manufacturing partnerships and now have the capacity to deliver hundreds of housing units annually across both East and West Coast states. We’ve also signed partnerships with leading architecture firms and general contractors to jointly bid on larger projects. Additionally, we have been fundraising, establishing processes, and hiring key talent for our team. All of these activities are aimed at laying a strong foundation to deliver on our 2025 goals.” In November 2024, Kit Switch won the prestigious **US Bank Cleantech Foundation Award**.



Converting plastic waste into low carbon buildings.

As winners of Startup of the Year, **Global Startup Awards**, 2023, Startup of the Year and ESG Tech of the Year, **African Startup Awards**, 2022, and named in the **TIME100 Climate list**, Kubik's impact is well recognized. Founded in Ethiopia in 2021 by Kidus Asfaw and Penda Marre, 2023 saw Kubik complete the establishment of its factory, scale production, increase headcount and develop its sales pipeline.

Gaining traction has taken longer than expected, but we have had breakthroughs.

In 2024, "gaining traction has taken longer than expected, putting pressure on our runway," said Asfaw. "But we have had breakthroughs in sourcing large volumes of plastic waste at an affordable price and locking in strategic clients for growth next year."

Kubik aims to end 2025 by reaching 10 times current production capacity. The team estimates that 309,000kg of plastic has been recycled, 46,300kg of CO2e has been avoided, and 817 women waste pickers have been empowered through Kubik's collection operations.



Using Kenyan avocado surplus to avoid waste, create value-added products, and support the local economy.

Founded by Rosemary and Kimutai Rop, Kuishi's impact stems from increasing carbon sequestration through avocado tree cover, surplus reuse, and more sustainable farming practices. "We are also adding value to the local economy through jobs, local product availability, and resource use efficiency," said Rosemary.

Their JLL Foundation loan supported the establishment of Kuishi's avocado oil production plant. "The factory building has created a crucial basis for the business to grow. We have also established an avocado tree nursery and are including preparation of briquettes and waste recycling from the avocado processing waste, which will reduce the amount of wood fuel used to power the factory by 40%."

The factory has attracted a lot of excitement from the local community and leaders. They are looking forward to the job creation, new industry and growth that it represents.



Improving residential energy efficiency through insulation.

Founder and CEO, Evan Arnold, established his company in 2021 to help insulation and efficiency contractors seamlessly manage their business operations. "The JLL Foundation's loan enabled us to launch several small experiments in how to effectively go to market with new products. We were very encouraged by the impact we made," said Arnold.

LayerUp's customers will be in good hands with the team at GIC.

In November 2024, Arnold sold LayerUp's software assets to **General Insulation Company, Inc.** "It's a big leap for a contractor to run their business on a newly launched product. I feel fantastically lucky to have had so many people take a chance on me and LayerUp. And I feel a mixture of pride and relief to know that gamble will pay off with an enduring software product. LayerUp's customers will be in good hands with the team at GIC."

The sale of LayerUp's software allowed a partial repayment of the JLL Foundation loan.



Upcycling reusable packaging solutions.

LimeLoop made significant strides in 2024 despite a challenging economic environment.

Co-founded in 2018 by Ashley Etling and Chantal Emmanuel, "LimeLoop made significant strides in 2024 despite a challenging economic environment", said Etling. "By collaborating with enterprise giants like Google and Apple, we've facilitated large-scale system changes and successfully positioned LimeLoop as a key player in sustainable solutions, emphasizing the importance of innovative approaches that go beyond just reusable packaging."

LimeLoop achieves up to a 93% reduction in CO2 emissions compared to traditional packaging methods. Each package can be reused over 50 times, replacing more than 100 single-use cardboard boxes or mailers. Our team proudly participated in the World Economic Forum in Dalian, China, where we engaged in discussions on global sustainability challenges and showcased our innovative solutions. Additionally, LimeLoop has been actively involved in the development of the Global Plastics Treaty, emphasizing our commitment to reducing plastic waste and promoting sustainable practices worldwide."



Improving crop yields for smallholder farmers in India while storing carbon.

Founded in 2021 by Shantanu Agarwal (CEO), 2024 was a transformative year for Mati Carbon.

We achieved major milestones in science, market expansion and growth.

"We expanded into three states in India and started operations in Zambia and Tanzania. We grew our team from 20 people at the start of the year to 59 people in November 2024, secured a grant from the **Livelihood Impact Fund**, and raised funds through a successful crowdfunding campaign with Wren. We also obtained another grant from the **Schmidt Family Foundation** in 2024.

In India, we partnered with over 9,000 smallholder farmers, deploying 80,000 tons of basalt dust across six districts and three states. These efforts will sequester over 18,000 tons of carbon from the atmosphere, with durability exceeding 10,000 years, while simultaneously enriching soil health and boosting crop yields. Over 10,000 farmers' lives in India will be directly impacted by the increased crop yields in 2024. This has resulted in over USD1m in increased income for farmers in 2024 alone."



Growing carbon-negative biogenic limestone.

Minus Materials' biorenewable limestone has the potential to transform the future of building materials, cosmetics, and food supplements. "If all Portland cement was manufactured using carbon-negative limestone as the main feedstock material, two gigatons of CO2 would no longer be pumped into the atmosphere and more than 250 million additional tons of CO2 would be removed and stored in the resulting structures each year," said co-founder and CEO Sarah Williams PhD.

2024 was an exciting year for Minus Materials.

"We made progress on commercial partnerships, refined our product-market fit, and set up a 1,300L working volume pilot production plant in San Francisco.

We are grateful for the support of the JLL Foundation and would like to stress that this has been an excellent experience for us. We are looking forward to new programs like marketing mentorship in the coming months."



Transforming byproducts into sustainable, nutrient-rich, upcycled food ingredients.

NETZRO is a food upcycling platform that recovers and reharvests food that would otherwise be wasted and “powers it forward to feed more people.”

Based in Minnesota and founded in 2017 by Sue Marshall (CEO), NETZRO has grown from operating at laboratory scale to commercial-scale plants.

2024 was a pivotal year for NETZRO in finding partners to license our IP and secure a strategic partner for equipment manufacturing.

“We captured approximately 6,000 pounds of food waste, converting it into new upcycled ingredients that have been sold to food manufacturers, and we are currently fundraising to support our growth strategy,” said Marshall.

NETZRO won the pitch contest at ReFED’s 2024 food waste summit. “We’re staying focused on providing smart technology, sustainable processes and safe, healthy upcycled ingredients, at scale. Our goal is to create local upcycling communities that can be replicated anywhere in the world with our equipment.”



Capturing carbon and using renewably sourced hydrogen to produce high quality protein.

Founded in 2017, NovoNutrients transforms industrial emissions into sustainable, low-cost feed and food ingredients using microbes to convert CO2 and hydrogen into protein. “Our first world-scale plant will upcycle almost 200,000 tons of CO2 per year, tackling the world’s urgent need to reduce CO2 emissions and its hunger for high-quality protein,” said CEO David Tze.

In all the years we’ve been raising capital, the JLL Foundation was probably the fastest, lowest friction funding process we’ve experienced.

“We used the zero-interest loan to extend our operations so that we could achieve more significant funding. It has enabled us to get additional bridge funding and the critical time we needed to make the next big step in our commercialization journey.”



Repurposing discarded banana stems to create sustainable, plant-based hair extensions.

Rebundle’s simple value proposition “more comfort, less waste”, “better for your scalp, better for the environment” is set to transform the market for braided hair and hair extensions.

Founded in 2019 by Ciaria Imani May (CEO), Rebundle’s use of regenerative materials satisfies three of the United Nations Sustainable Development Goals: health, sustainable consumption and production, and climate action.

2024 was a reconstructive year for us.

Rebundle’s woman-led team in St. Louis, Missouri, is focused on deepening its supply chain development in East Africa. “2024 was a reconstructive year for us,” said May. Rebundle was recognized by Ebony magazine at the **2024 Ebony Power 100 Gala**, representing the STEM Trailblazers. “The recognition from our very own community makes this award even more special.”



Reusable packaging solutions to eliminate single use

Founded in 2020 by Caroline Vanderlip (CEO), Re:Dish delivers, collects, cleans, sanitizes and returns containers and dishware to help corporate and school cafeterias, pantries, production sets – anywhere food is served at scale – run more sustainably. This service is supported by a dashboard to manage reusables inventory and environmental impact, enabling businesses to reduce costs and keep track of ESG goals.

Re:Dish received its first loan from the JLL Foundation in 2022, which was repaid in just four months. “Since then, we have continued to grow. We have added new clients, expanded our New York operation from one to two shifts and opened another industrial ware washing facility in Philadelphia,” said Vanderlip.

The second loan from the JLL Foundation in 2024 enabled us to open a Re:Dish facility in Boston.

“In Boston, we are starting to service multiple public school systems in the market, including all eight of the Needham, MA schools, as well as to expand our capacity in NYC.”



Manufacturing construction materials from on-site waste.

Founded in 2017 by Keegan Kirkpatrick (CEO), Redworks’ In-Situ Additive Construction (ISAC) 3D printer can reduce masonry material costs by as much as 98% and virtually eliminates shipping costs by enabling builders to control the supply chain on site.

We spent 2024 solving some design issues, securing new facilities, and discovering new strategic partners.

“We spent 2024 solving some mechanical design issues with our prototype, securing new facilities, and discovering new strategic partners that will make it possible for us to debut a commercial product in 2025. This will help the construction industry build with less reliance on hydrocarbon spewing supply chains,” said Kirkpatrick. “We have also explored ways to use our technology to encapsulate coal ash into a transportable, inert block, reducing harm to air quality and local environments.

Backpressure problems were a stumbling block in 2023, which we have now resolved thanks in part to our remaining capital from the JLL Foundation. JLLF have been true friends to RedWorks, and we thank them for their well-run investment process.”



Reducing reliance on animal protein through mushroom cultivation.

Sempera produces food and functional ingredients for a global market at their zero-waste, sustainable lab farm in Silicon Valley, California, meeting 12 of the 17 UN Sustainable Development Goals.

Founded in 2020 by Nirmal Nair (CEO), the team’s vision is “to feed and heal the world using fungi,” said Nair.

2024 marked the beginning of Sempera Organic’s growth phase.

“The market is asking for more product and we are working hard to deliver, scaling up our indoor growth technologies to create a climate change resistant food supply. We launched a clinically tested brain health product (SO-DSX1) made from Lions Mane mushrooms, which is gaining a lot of market interest, and Sempera Organics was selected as part of the **Mista Growth Hack** symposium in November 2024 to present and demonstrate our mushroom based pizza toppings (Mamu).”



Producing a plant-based alternative to animal leather.

Headquartered in New York, Slow Factory's first product, Slowhide, is made using tea and coffee waste that would otherwise go to landfill, "no plastic, no synthetic chemicals, no toxins and almost no carbon footprint."

2024 has been a difficult year.

Despite "presenting our products and innovations to the world in all conceivable ways" 2024 has been a difficult year for the business. "We have found there is still a gap to commercialization that requires funding at a level we are unable to secure at this time. The whole material innovation space has been experiencing a recession even more intense than the larger, early-stage investment market shift away from longer development time companies. We see major competitors falling to the same macro-economics," said co-founder and CEO Céline Semaan.

"After in-depth conversations with hundreds of venture capital firms and family offices, we've found that the market is just not willing to support the 'last mile' material science commercialization development required to take industry-changing innovations like Slowhide from the lab to production scale."



Alumni

A software platform that makes climate impact tangible.

Tangible's software enables real estate developers, architects and contractors to identify, procure, manage, and report on products that meet their carbon, environmental, and social goals. This includes embodied carbon, which can make up as much as 80-90% of a real estate developer's annual emissions.

Based in San Francisco, the company was founded in 2021 by Anneli Tostar (CEO) and Nicole Granath (COO). 2023 saw the business close its USD3m seed round, take on senior hires and launch the platform to its first paid customer.

Our priority in 2024 was getting our commercial engine off the ground.

"We recently closed a further seed round. Our priority in 2024 was getting our commercial engine off the ground, expanding with first customers, and developing a best-in-class product for embodied carbon management. We now have over 100m square feet of development on the Tangible platform," said Tostar. Tangible repaid their JLL Foundation loan in December 2024.



Manufacturing affordable, silica-based insulation aerogels to decarbonize buildings and transport.

Founded in 2019 by Sam Cryer PhD (CEO) and Alex Murdock (who in 2024 became a fellow of Forbes 30 under 30 in the category of Manufacturing and Industry), the team operates out of a laboratory in London.

2024 has been a great year with team growth, big milestones hit and new commercial collaborations, including our first six-digit paid client project in the construction insulation space.

"We are still at an early stage and so estimating our impact is hard but we have integrated successfully into two EV safety products, which will enable customers to deploy electric vehicles and meet new safety regulations."

The JLL Foundation investment process was "pretty slick", said Cryer. "The founder-friendly documents enabled speed. We also really loved meeting everyone in San Francisco."



Alumni

Quantifying the carbon footprint of waste.

WATS (Waste Administration + Tracking Software) makes it easier for businesses to recycle more, divert materials from landfills and incinerators, and reduce their impact on social and natural ecosystems. Its software quantifies the carbon footprint of waste and delivers action-oriented steps to support the transition to a circular economy.

Founded in 2022 by Meredith Danberg-Ficarelli (CEO) and Laura Rosenshine (COO), WATS repaid its JLL Foundation loan the following year and has continued to raise capital as part of its growth strategy.

2024 was a year of data-driven impact and growth.

WATS transformed fragmented waste data into high-quality baselines, uncovered cost-saving opportunities, and supported customers to better understand their waste so they can report with confidence. The team welcomed new talent across engineering, design, and customer success, growing to 11 full-time members. The company also published its first case studies, showcasing how WATS delivers real results, empowering organizations with the tools they need to measure, manage, and minimize waste.



100% tree-free pulp, paper and paper products using agricultural waste.

Founded in 2017 by women entrepreneurs, Zafree Papers is working with farmer unions on sourcing raw material for its products. Currently operating in Ethiopia and Zambia, Zafree is pursuing a pan-African business model, building on its track record in the Ethiopian market. "We are building mutually beneficial relationships with small farmer unions by buying their banana stem, which would otherwise be burned, and selling them back a value-added by-product or organic fertilizer at a price significantly below market rates," said Founder and CEO Bethelhem Dejene.

2024 Global Startup Awards Africa, Founder of the Year Regional Winner.

In addition to product innovation and increased production, 2024 saw the launch of Zafree ELEVATE, a program that teaches women how to make different papers, paper products and packaging. The training provided is intended to help participants start their own businesses and potentially become Zafree franchisees.

In 2024, Dejene was named the **Global Startup Awards - Africa, Founder of the Year Regional Winner.**

Awards and recognition

We are proud that so many of our portfolio companies were recognized for their achievements in 2024 by some of the most influential publications and organizations around the world. Listed below are the awards shared with us by our portfolio companies.



Kate Murphy PhD (third from left) Co-Founder and CEO of Aquarry at the **VERGE 24 by Trellis: Top Climatetech Startups in 2024** awards, where Aquarry took first place. VERGE 24 by Trellis (previously GreenBiz), is a three-day climatetech conference that brings together new companies and professionals catalyzing change. Its startups and speakers innovate towards net zero in areas such as land use, energy, transport, buildings, and industry.

Aquarry	VERGE 24 by Trellis: Top Climatetech Startups in 2024 – first place Trellis: 25 Climate Tech Startups to Watch in 2024
Cadence OneFive	Trellis: 25 Climate Tech Startups to Watch in 2024
Carbonwave	Environmental Finance: Voluntary Carbon Market Rankings 2024 – Best individual offsetting project Fast Company: The most innovative companies in agriculture for 2024 Nominated for the 2024 Earthshot Prize
Courageous Land	Bloomberg: 2024 Bloomberg New Economy Catalysts - Philip Kauders Selected by the Clinton Global Initiative as top global startup
Hydronic Shell Technologies	US Department of Energy: Home Electrification Prize Syracuse COE: Innovation Fund Awards New York State Energy Research and Development Authority: Empire Technology Prize
Kadeya	Fast Company: The best circular design of 2024 Trellis: 9 Emerging Names to know in Reuse – Food and beverage Automation & Self-Service Awards: Responsible Innovation Award
Kit Switch	US Bank: Foundation Cleantech Award
Limeloop	Tech News 180: 40 top sustainable packaging manufacturers
Mati	XPrize: Top 20 Finalist for XPRIZE Carbon Removal
Mycocycle	Fast Company: The 5 next big things in building and real estate technology for 2024 Climate Insider: Top 9 Environmental Remediation Companies in 2024 1871: Annual Momentum Award Winners – Rising Star Award Forbes: 50 Over 50: Innovation – Joanne Rodriguez Chicago Inno: The Fire Awards – 50 companies igniting Chicago's startup scene Trellis: 12 innovative circular economy startups in 2024
Rebundle	Harpers Bazaar: The 8 Best Braiding Hair Options for your Next Protective Style
Still Bright	World Economic Forum/Uplink Sustainable Mining Challenge 2024 - Winner
Thermulon	Engineering Matters: 2025 Awards
Urban Machine	USGBC California: Mighty Materials Award
Zafree Papers	Global Startup Awards Africa: Founder of the Year: Bethelhem Dejene

JLL Foundation's mission is to drive lasting positive climate impact, globally

We provide catalytic capital to climate-impacting start-ups focusing on seed-stage companies.

Circularity is key to our mission and our model.

By providing zero-interest loans, we fill a crucial gap in early-stage funding especially for founders from diverse community backgrounds who often face barriers to traditional investment. The returned funds get invested in new loans, creating a virtuous cycle.

A circular economy is fundamental to the mitigation of climate change and the path towards sustainability. The companies we support are contributing to this in different ways, from their use and reuse of raw materials, design and innovation, to recycling and waste management.

Extending our reach

An important part of our mission is to extend our impact by building a network of like-minded investors, providing loan recipients with access to support from our connections beyond the Foundation.

Our regular portfolio company surveys show that the straightforward injections of capital we provide are highly influential in helping recipients to secure additional funding from for-profit companies and other foundations, which has often been as important to them as the loan.

Selection criteria

Companies are selected for their ability to provide lasting, positive climate impact, the experience and talent of their teams, and capacity to scale to other countries.

Startups founded by women often struggle to raise venture capital funding in Europe and the United States. Such founders have provided us with a rich pipeline of impressive innovation, which meet and exceed our funding criteria.

We fill a crucial gap in early-stage funding. The returned funds get invested in new loans, creating a virtuous cycle.

Trish Maxson
Chair, JLL Foundation



Left to right, Nancy Everett (General Counsel, JLLF), Jen Cole (COO, Good Machine), David Solomon (CEO, Good Machine), Trish Maxson (Chair, JLLF), Gayle Kantro (Mentoring Program Coordinator, JLLF), Riina Hynninen (Director of Operations, Good Machine Studio), and David Solomon (CEO, Good Machine).

Our partnership with Good Machine Studio is a fundamental part of our model. Good Machine is a venture studio that invents, deploys, and scales solutions to the world's most pressing problems. It recognizes that climate catastrophes and ecosystem collapse threaten our shared future, and that traditional venture capital and philanthropy alone cannot meet the pace of change facing humanity.

By leveraging a world-class network of research and innovation facilities, NGOs, philanthropies, corporates, engineers, scientists, and venture capitalists, Good Machine creates end-to-end solutions for critical global challenges.

Increasing global climate entrepreneurship

As a partner of the US Department of State's Coalition for Climate Entrepreneurship (CCE), Good Machine hosts both the Silicon Valley and Global CCE Hub programming through its innovation space in San Francisco. Through the CCE program, Good Machine provides a venue for climate-focused founders from developing economies to interact with Silicon Valley's entrepreneurship ecosystem and receive training, mentorship, and guidance to catalyze climate technology investment and adoption.

Incubating impactful companies

Good Machine's portfolio companies span robotics and automation, earth data observation, energy resilience, and sustainable agriculture. As of 2024, Good Machine technologies have been deployed in over 40 countries worldwide, positively impacting climate outcomes and livelihoods.

"We find the most promising climate-tech startups for JLL Foundation's consideration. Once funded, we roll up our sleeves to help these ventures accelerate customer growth, refine their products, and secure additional capital. Our mission is to transform innovative ideas into scalable, revenue-generating businesses that drive real climate impact, especially within the built environment."

David Solomon, CEO
Good Machine Studio

A strong proponent of the transformative potential of early-stage ventures, Good Machine enables the growth of promising companies using various approaches.

Build: Incubate a portfolio of companies using moonshot tech for good.

Advise: Provide expertise that unlocks breakthrough innovations for impact-driven companies.

Fund: Support promising early-stage companies to catalyze global change.

Governance and operations



Trish Maxson
Chair, JLL Foundation¹



Laura Adams
Director, JLL Foundation¹
Chief Human Resources Officer, JLL



Richard Bloxam
Director, JLL Foundation¹
CEO, Capital Markets, JLL



Mark Gabbay
Director, JLL Foundation¹
CEO, LaSalle Investment Management



Yishai Lerner
Director, JLL Foundation¹



Erin Meezan
Executive Director, JLL Foundation¹
Chief Sustainability Officer, JLL



Neil Murray
Director, JLL Foundation¹
CEO, Work Dynamics, JLL



Andy Poppink
Director, JLL Foundation¹
CEO, Markets Advisory, JLL



Riina Hynninen
Director of Operations,
JLL Foundation

¹ Investment Committee members

Get in touch

Are you a startup at an early stage that provides lasting, positive climate impact?

Do you also have a diverse team or ownership structure?

Does your innovative approach scale to other countries around the world?

Or are you an impact investor looking to co-fund climate solutions?

If so, please get in touch.

Contact

info@foundation.jll.com | foundation.jll.com



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