FERMENSTATION
Co.,Ltd.
Fermenting a Renewable Society

Certified
B
Corporation

FERMENSTATION Impact report

Fermenstation is a biotech startup advancing the circular economy by upcycling unused resources through proprietary fermentation technology.

2024

Fermenting a Renewable Society

“Fermenting a Renewable Society”

We have established our purpose—Fermenting a Renewable Society—to create a world where unused resources are given new value through fermentation technology and transformed into something even more valuable, forming a society based on regeneration and circulation. Our aim is to redefine the way resources are utilized, with unused resources as the key, and to build a world that eliminates the very concept of resource waste, underpinned by resource circulation.

Through passing through FERMENSTATION—a “station” for all stakeholders including the natural environment, society, and everyone involved—we aspire to create positive change, so that everything and everyone continues to become better than before.

Fermentation, a phenomenon in which organic matter is transformed into something beneficial to humans through the action of microorganisms, is the origin of our company and our greatest strength. It is also a phenomenon that symbolizes the very essence of Fermenstation. Just like microorganisms in fermentation, we aim to be a positive force in society. By using the word “Fermenting” in the present continuous form, we express our determination and desire to keep on acting and moving forward.

We also believe that it is essential for businesses and society to constantly regenerate and continue to evolve for the better. This is why we chose the word “Renewable”rather than Sustainable. The process of regeneration comes with various challenges, but we see overcoming these challenges, creating new value, and renewing society and business as the true essence of what we do.

Furthermore, the foundation of our business lies in our relationships with all kinds of stakeholders—such as those who generate unused resources, companies that want to make effective use of them, local communities, governments, and impact communities both in Japan and overseas. Having a broad range of connections with society is one of Fermenstation’s defining characteristics, and by using the word “Society”, we express our commitment to maintaining a community-oriented perspective as a responsible member of society.

The name Fermenstation is a coined term that combines the English words fermentation and station. It reflects our desire to be a place where various resources are transformed through the use of fermentation technology, and where something positive always happens when people or things pass through—just like a station.

FERMENSTATION
Co.,Ltd.
is

Fermentation
Circular Economy
Upcycle
Climate Tech
Deep Tech
Food Tech
Impact Startup
Regenerative

“What’s complicated remains complicated”

We’re often asked, “What kind of company is Fermenstation?” We use fermentation technology, so we could be called “Fermentation Tech,” but we’re also “Deep Tech” in the sense that we use innovative technology to solve social issues, and in the context of striving for a circular economy, we could also be called a “Circular Economy” company. Other names include “Impact Startup,” “Climate Tech,” and “Food Tech,” but we believe they’re all correct. In today’s society and business world, where various elements are intricately intertwined due to diversity and globalization, it’s necessary to tackle major challenges by crossing and transcending genres and boundaries. Fermentation is about “keeping complex things complex” and sincerely addressing all directions.

Introduction

“Together with you, I want to create a world where both business viability and social responsibility are the norm.”

Lina Sakai

Fermenstation Co., Ltd.
Founder and CEO

After graduating from International Christian University (ICU), She worked for several financial institutions, including Fuji Bank and Deutsche Securities. She then became interested in fermentation technology and enrolled in the Department of Fermentation Science at the Faculty of Applied Biological Sciences at Tokyo University of Agriculture, graduating in March 2009. In the same year, She founded Fermenstation Co., Ltd. and has since served as its CEO (current position).

At Fermenstation, we aim to create a society where unused resources are utilized and circulated, leveraging fermentation technology.

In pursuing our business, we believe that even if a venture is financially viable, it is meaningless if it doesn’t also have a positive social impact. However, simultaneously growing the business while generating a greater positive impact on the environment and local communities—balancing profitability and social good—is often challenging. This is because it cannot be measured by traditional thinking or indicators like financial statements alone, and there are no clear-cut answers.

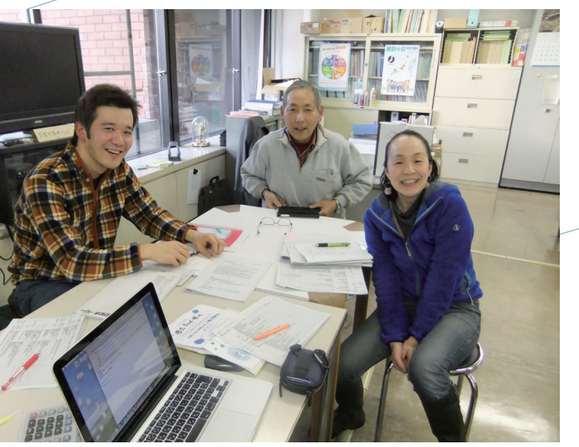
This marks our third year issuing an Impact Report.

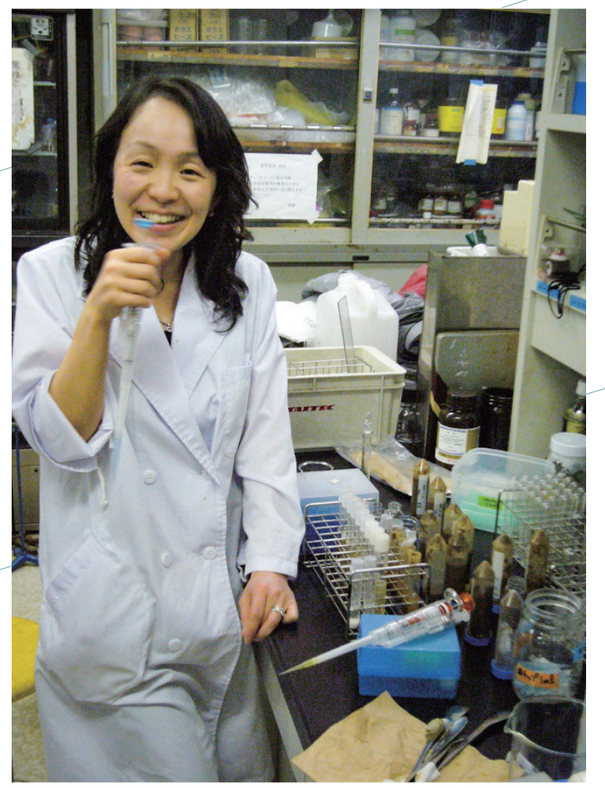
In this report, we will share how Fermenstation strives to create impact, and what initiatives we’re undertaking from the perspectives of business, technology, and organization, all in pursuit of balancing profitability and social good. We will present our activities and achievements. We particularly invite you to see the evolution from last year, especially the process and content of our impact model creation. Furthermore, we’ve included insights into our trial-and-error approach. We hope this serves as a valuable reference for those who share our aspirations.

Our challenge is something that cannot possibly be achieved by one company alone. It will be realized through the collective efforts of all our stakeholders involved in the business, local communities, and those who purchase products containing our upcycled ingredients.

We hope this report reaches as many people as possible. And, by receiving your feedback, we aim to work together with those who read this report to make a world where balancing profitability and social good becomes the norm.

History





“I want to solve the global issues through business.”

It all started when I came across a research topic called “Converting food waste into energy.”

I felt extremely uncomfortable when I was told, “If you’re not going to eat it, throw it away.”

“Establishing technology to create materials from unused resources” and “Realizing a resource-circulating society”

Fermenstation was founded with the goal of utilizing “unused resources” that abound in society to create a circular economy, and of establishing a business that balances profitability with social impact.

After graduating from university, the company’s founder, Lina, joined a major commercial bank. During her third year, she was seconded to the Japan-U.S. Center of the Japan Foundation, where meeting people working to solve social issues became a turning point in her life. She began to think, “I want to solve societal problems through business.”

Later, she was in charge of project finance for energy and infrastructure at the bank, which deepened her interest in the environment. However, she found no opportunity to be involved in projects that were environmentally friendly. After moving to a foreign-affiliated securities firm, she went on a business trip to New York.

There, at a fast-food chain, she ordered one cheeseburger but was mistakenly given two. When she declined the extra burger, she was told, “If you’re not going to eat it, just throw it away.” This experience left her with a strong sense of discomfort and prompted her return to Japan.

While questioning, “Isn’t it wrong for so much food to go to waste?” she happened to see a TV program about a research project at Tokyo University of Agriculture (Tokyo Nodai) on converting food waste into energy. Inspired by this, she decided to apply to the Department of Brewing Science at Tokyo Nodai’s Faculty of Agriculture, where she studied fermentation. Upon graduation, she founded Fermenstation in 2009 to build a business that utilizes unused resources through fermentation technology.

At the time of its founding, before the adoption of the SDGs, there was little demand for sustainable materials. The company therefore began by selling cosmetics made with ingredients it produced in-house, demonstrating examples of how unused resources could be utilized, and thus helped to create a market for sustainable materials.

In addition to pursuing sustainability, Fermenstation continues to push forward as a pioneer, confident in its mission to establish technologies that produce functional materials from unused resources and to realize a circular economy in the future.

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Social Issues

The realization of a circular society can help solve a wide range of social issues.

Among these, we are currently focusing particularly on three key challenges: waste, petroleum dependence, and resource scarcity.

We look at social issues from multiple perspectives, and create a multifaceted impact where one solution will also solve other issues.

As introduced in the Purpose section, we aim to realize “Fermenting a Renewable Society” by discovering new value in unused resources and building a society based on regeneration and circulation. Rather than simply acting as a vendor handling unused resources, we are working toward expanding foundational technologies and platforms that transcend industries. Therefore, instead of focusing on a single specific issue, one of the distinctive features of Fermenstation’s business is its multi-faceted approach that seeks to generate multi-dimensional impacts, where a single solution contributes to resolving multiple interconnected social issues. In particular, by viewing waste as unused resources and addressing the issue through an approach of fermentation upcycling, we believe we can also contribute to solving petroleum dependence and resource scarcity.

First, regarding the issue of waste: In today’s society, which is based on mass production and mass disposal, many unused resources that could otherwise be utilized end up incinerated or landfilled as industrial waste or household garbage. This leads to environmental problems such as CO_2 emissions and soil degradation. Although some progress has been made in the utilization of unused resources, such as converting them into fertilizers or animal feed, further expansion is urgently needed.

Fermenstation places particular emphasis on reducing food waste. According to estimates by UNEP (United Nations Environment Programme), food waste accounts for about one-third of global food production, and 8% to 10% of global greenhouse gas emissions are attributed to food waste. The fact that countries around the world have set food waste reduction targets for 2030 based on the SDGs underscores that this is a global common challenge. In Japan as well, according to estimates by the Ministry of Agriculture, Forestry and Fisheries, food waste in fiscal 2021 amounted to 24.02 million tons, of which 7.32 million tons came from households and 16.7 million tons mainly from food manufacturing processes. About 80% of the waste generated during food manufacturing is recycled, but 90% of that is limited to use as animal feed or fertilizer.

Fermenstation focuses on upcycling food waste into higher value-added materials and products. Through upcycling, it is possible to utilize unused resources as new functional materials, preventing both resource waste and disposal at the same time. Furthermore, beyond food waste, we are also engaged in the utilization of wood generated from forest thinning and logging, stems and leaves left over after pruning and harvesting in agriculture, rice husks generated during grain threshing, biomass, and industrial waste from primary industries, as well as by-products from industrial manufacturing processes.

The impact of waste reduction extends to solving issues of petroleum dependence and resource scarcity. By applying upcycling technologies in the emerging field of bio-manufacturing, we are replacing fossil-derived materials like petroleum with bio-based raw materials, and establishing a sustainable manufacturing process that produces useful compounds through the power of microorganisms. According to OECD estimates, the global market for bio-manufacturing is expected to reach approximately 200 trillion yen by 2030. By utilizing upcycled raw materials derived from unused resources, we can contribute to reducing petroleum use and realizing a decarbonized society.

In addition, since biomass production is limited in Japan, resource shortages are a concern as bio-manufacturing expands. Furthermore, ensuring transparency of raw materials is also a challenge when sourcing materials from overseas. Against this backdrop, utilizing unused resources such as food waste is an effective approach to promoting sustainable bio-manufacturing. Circulating resources domestically can also help ensure transparency of raw materials and contribute to food security.

What we aim for beyond solving these issues is not merely reducing waste, but shifting from a linear consumption model of “use and dispose” to a new upcycling ecosystem. By maximizing the use of unused resources and circulating the value of resources, we are building a new foundation for sustainable bio-manufacturing. We will continue to work together with diverse stakeholders to solve social issues and build a new ecosystem that cannot be achieved by one person or company alone.

Approach

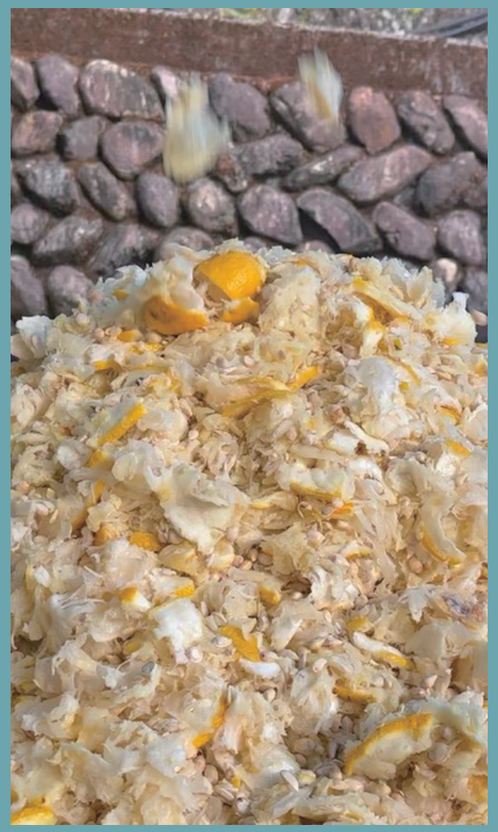
We are engaged in a business that upcycles “unused resources” into high-value-added “functional bio-based materials” through fermentation technology. Upcycling means transforming resources that have been used once and would otherwise be discarded as waste or by-products within conventional systems into higher-value products using various ideas and methods. While it shares the concept of resource reuse with reuse and recycling, what sets upcycling apart is the enhancement of value.
We possess a rich database on unused biomass, a library of microorganisms, and extensive expertise and development systems related to fermentation methods, as we challenge ourselves to build a unique upcycling model that converts unused resources into functional bio-based materials.

What is Fermentation Technology?

The general definition of fermentation is “the decomposition of organic matter by microorganisms to produce specific substances beneficial to humans.” In addition to familiar fermented foods such as pickles and cheese, fermented beverages such as sake, and fermented seasonings like soy sauce and miso, fermentation technology is also used in the production of pharmaceuticals and the creation of compost from livestock manure and vegetable scraps.
Moreover, fermentation technology plays a key role in the emerging field of bio-manufacturing, which uses biomass and other biological resources for production and harnesses microorganisms to produce useful compounds. Fermentation technology is a core process for realizing these initiatives, enabling the creation of biofuels and bioplastic materials.
Our fermentation technology features an upcycling technology platform that can convert resources with diverse compositions into high-functionality bio-materials. We have built know-how that allows us to apply appropriate combinations of technologies and conditions to various organic materials by utilizing our diverse library of microorganisms such as koji molds, yeasts, and bacteria. We also possess a technology platform to quickly identify optimal fermentation conditions and design fermentation-derived products for each organic material. Furthermore, with our in-house manufacturing facilities, we can seamlessly support commercialization.

What are Unused Resources?

Unused resources refer to materials that have been discarded without effective utilization or have traditionally been considered unnecessary. We focus on those that are discharged as food waste across the food supply chain and to which fermentation technology can be applied.



Examples include

Materials containing monosaccharides
Sugarcane, fruits, vegetables with high sugar content, pure sugars, etc.
→ Fruits and vegetables discarded at primary production sites due to non-standard size or quality
→ By-products generated at food and beverage manufacturing plants

Materials containing starch
grains (such as rice, wheat), tubers, pure starch, etc.
→ Rice grown on restored fallow fields
→ Grains or tubers that are non-standard and unsuitable for consumption
→ Surplus items (such as cooked rice) from food factories or food service sites

Materials containing fiber (cellulose)
wood, paper, vegetables rich in fiber, etc.
→ By-products generated at food and beverage manufacturing plants (such as juice or wine pomace)
→ Unused felled wood or pruned branches
→ Unused waste paper or pulp

What are Bio-based Materials?

Bio-based materials are raw materials derived from biological sources, such as plant-based biomass. This field is attracting cross-industry attention as a means to replace materials that still depend heavily on fossil resources like petroleum. The materials we produce using fermentation technology cover a wide range of applications, including food ingredients (flavorings, taste enhancers, functional ingredients), plant-based food materials, plant-derived ethanol, and fermented extracts for cosmetics—all of which fall under bio-based materials.

Business Overview

At Fermenstation, we operate four core businesses built upon our proprietary database of unused biomass and microorganisms, combined with our fermentation upcycling technology. In 2024, we made a full-scale entry into the food and beverage market, launching drinks that incorporate our upcycled ingredients as functional components.

Research & Manufacturing

Supporting these four businesses are our research and development center in Tokyo and our factory in Oshu City, Iwate Prefecture. The Tokyo R&D center focuses on cutting-edge bio-manufacturing, the development of new technologies, and prototype testing. Meanwhile, the Oshu City manufacturing site works closely with the research team to scale up and commercialize these innovations.

Co-Creation Business

We collaboratively develop functional bio-based ingredients with food manufacturers and cosmetic brands, using manufacturing by-products mainly from food and beverage factories. When these developments reach commercialization, we provide integrated support from development through to manufacturing contracts and licensing. In doing so, we respond to social needs such as food loss reduction, petroleum alternatives, and clean labeling, actively promoting the social implementation of upcycled unused resources.

"Takara Fermented Distilled Sour" made with alcohol, jointly developed with Takara Shuzo Co., Ltd.

In-House Brand Business

To directly communicate the value of upcycled ingredients to consumers, we operate our own organic cosmetic brand, featuring organic rice-derived ethanol and fermentation-based ingredients.

Outdoor spray made from rice

Ingredient Business

Cosmetic Ingredients

We manufacture and sell plant-derived fermented ethanol and fermentation extracts, primarily for use as cosmetic ingredients. These upcycled resources are produced using environmentally conscious methods, resulting in sustainable ingredients that also feature the high functionality inherent to fermentation.

Food Ingredients

Harnessing the unique qualities of fermentation, we manufacture and sell food bio-ingredients that enhance flavor, richness, and functional benefits in the beauty and healthcare sectors. We are currently developing fermentation extracts suitable for a wide range of applications including dairy, confectionery, and seasonings, as well as flavor ethanol for alcoholic and non-alcoholic beverages.

OEM Business

By utilizing unused resources, we support environmentally conscious brand building with a focus on both storytelling and functionality. We accept collaborative product development commissions for hygiene products, cosmetics, and daily necessities — assisting in launching natural and organic cosmetic brands and sustainable lifestyle goods.

Certification obtained

Certified USDA NOP Organic and Ecocert COSMOS as ingredients derived from organic JAS rice grown on abandoned farmland

JAS EFRN 認証番号：600606P133 有機栽培米

USDA ORGANIC

ECOCERT COSMOS ORGANIC

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Core Technology

1 The Importance of Upcycling

Upcycling is a concept distinct from recycling — it creates new value from waste materials and promotes a sustainable approach to resource utilization. By regarding by-products generated in food factories and other industries as “unused resources” and applying fermentation technology along with advanced processing techniques, it becomes possible to convert these materials into valuable new resources. The significance of upcycling lies in its ability to reduce environmental impact while simultaneously creating new economic value.

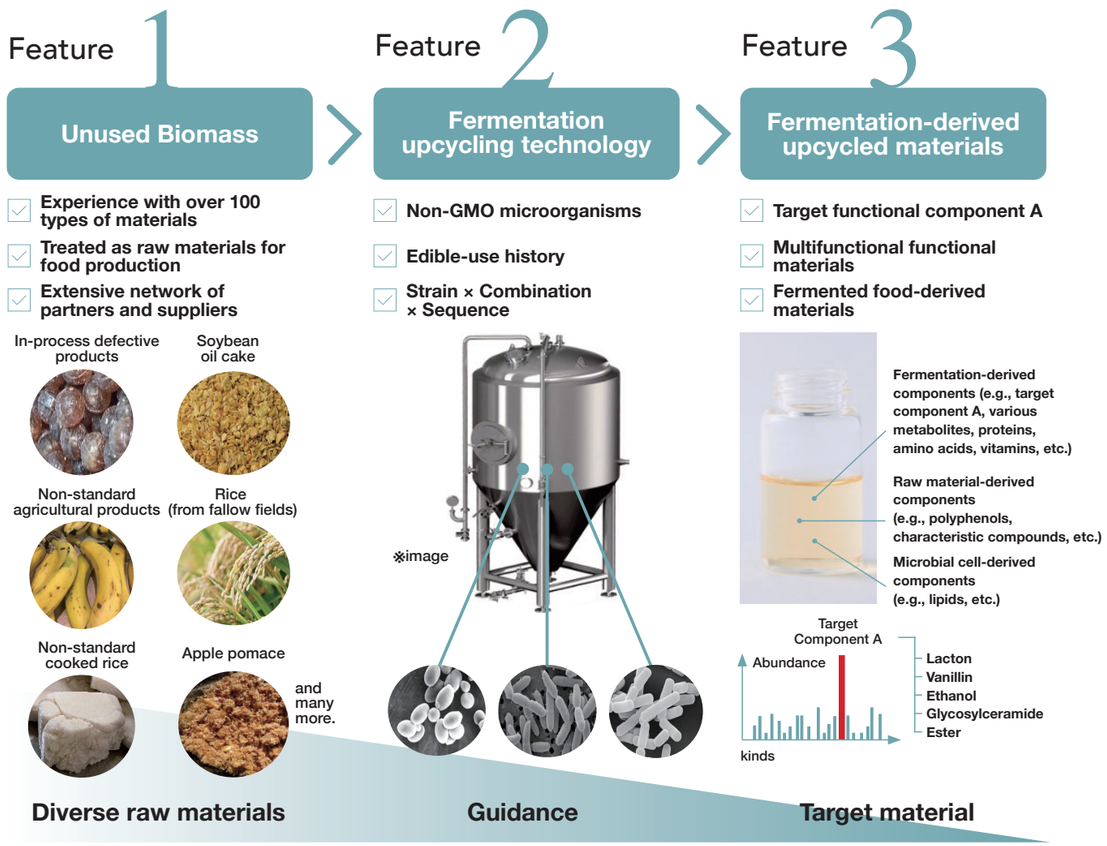
2 Fermentation Upcycling Technology Platform

We have established a Fermentation Upcycling Technology Platform with the goal of producing high-value-added food and cosmetic ingredients from unused resources, such as by-products from food manufacturing and non-standard agricultural produce (see Figure 1).

In our fermentation process, we select and combine optimal microorganisms and enzymes based on the composition of each unused resource to efficiently produce target components. We maintain a proprietary unused resource database and microorganism library, which enables us to flexibly design conversion pathways from specific types of biomass to specific target ingredients. Additionally, by using non-genetically modified microorganisms, we can quickly introduce safe, reliable products to the market — one of our key strengths.

（Figure 1）

3 Features on Fermentation Upcycle Technology



3 Two Technology Modules Saccharification Module and Fermentation Module

Unused resources are not a single raw material but a very diverse range of raw materials. Developing individual saccharification and fermentation processes for each unused resource and demonstrating the production process requires significant effort.

The fermentation upcycling technology platform we have developed consists of two technology modules: a “saccharification module” and a “fermentation module.” Several technology modules have already reached a level where large-scale demonstration is possible and have been applied to the development of several fermentation upcycled materials.

Saccharification Module

The saccharification module handles the process of decomposing unused resources into fermentable sugars using microorganisms. Unused resources are extremely diverse. They range from those containing fermentable sugars to woody biomass such as fruit residues and pruning trees. Therefore, selecting the appropriate enzymes and designing optimal reaction conditions for each is crucial. By providing a versatile saccharification module that can be used with a variety of unused resources, we can derive saccharification conditions with minimal effort and accommodate a wide range of unused resources.

Fermentation Module

The fermentation process involves bioconverting saccharified liquid using non-genetically modified microorganisms to produce flavor and color components. This process is based on mixed culture technology, which allows multiple microorganisms to interact with each other to efficiently produce target components. Unlike synthetic biology approaches, this unique fermentation process involves multiple microorganisms working together to produce substances. Furthermore, the fermentation module is designed to maximize the productivity of target flavor components. By combining the optimal fermentation module, we can tailor the flavor and aroma to meet customer needs and develop desired food ingredients in a short period of time. Ingredients produced through fermentation upcycling technology undergo a safe process using non-genetically modified microorganisms, and the fermentation liquid itself can be used as a food product, which we believe is another advantage.

Technological Modules for Biolactone Production

Saccharification Module

Unused resources
・Rice bran
・Soy pulp

×

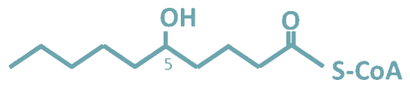
Enzyme Formulation
・Amylase
・Cellulase
・Protease

Fermentation Module

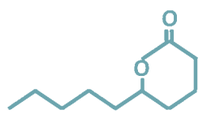
A process for producing lactone fermentation substrates utilizing the sugar-assimilation ability of yeast Step-1

A process for producing lactone precursors utilizing the enzymatic conversion ability of lactic acid bacteria Step-2

A process for producing lactones utilizing yeast fatty acid metabolism Step-3



Upcycled Materials



Fermentation broth containing decalactone

2024 in Numbers

Effective Utilization of Fermentation Residue through Composting

174.3 kg

At the Oshu Lab (now Oshu Factory), we began operating a compost system to convert lees residue (leftover material after fermentation of unused resources) into fertilizer. Over the seven months from June to December, approximately 174.3 kg of lees were effectively utilized as fertilizer.

Number of Internal Study Sessions on Impact

6

As part of our impact learning activities, we divided into three teams, each selecting a theme. Each team conducted research, site visits, and held seminars with external speakers. The themes were “Waste,” “Biodiversity,” and “Climate Change.” The main activities for each team were as follows:

■ Waste Team:

Visited waste processing and industrial waste disposal facilities with consideration for recycling.

■ Biodiversity Team:

Visited the site of Fisherman Japan, which engages in seaweed farming, and held an internal seminar with a guest speaker on biotopes.

■ Climate Change Team:

Conducted research on coffee, a crop greatly affected by climate change, and organized a seminar and internal study session on coffee.

Number of Metabolite Data Acquired

100 × 1,100

Through our extensive experience handling various unused resources, we have accumulated expertise in developing fermentation upcycled materials. Among these, we have obtained analytical data on 1,100 metabolite compounds derived from fermentation materials using representative combinations of food residues and microbes. We continually build knowledge to devise upcycling methods targeting a wide range of unused resources.

Number of External Lectures on Unused Resources, Upcycling, and Impact

39

In 2024, we delivered 39 lectures and webinars covering perspectives such as management, technology, and business. Each presentation incorporated discussions on social issues, explaining the current state of unused resources and the solutions our technology can provide.

Annual Topics

Jan.

> Completed fundraising of 230 million yen

Apr.

> Published the 2023 Impact Report

May

> Won the “SusHi Tech Challenge 2024 Best Award” at SusHi Tech Tokyo 2024

> Featured as a case study in the Circular Economy Partnership “2023 J4CE Public-Private Dialogue”

June.

> Launched new upcycled raw material “Golden Berry Leaf Extract,”

> first adopted in the product line “F ORGANICS”

July.

> Discovered the efficacy of a material using unused resources during the development of Yuzu Pulp Extract and filed a joint patent application

Aug.

> Released “Unused Biomass Data Sheet vol.2 – Comprehensive Metabolomic Analysis of Fermentation Materials, 1,100 Compounds”

Sep.

> Selected for the Ministry of Agriculture, Forestry and Fisheries SBIR project for Demonstration of mass production of upcycled green food ingredients utilizing unused biomass fermentation technology

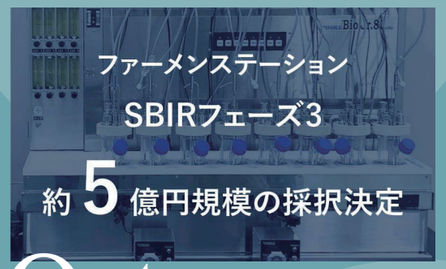
> Participated in the workshop on “Dialogue and Discussion between Investors and Impact Companies Using Impact Metrics,” hosted by GSG Impact JAPAN National Partner

> Won the Grand Prize at “JOIF STARTUP PITCH 2024”

> Launched an RTD beverage containing spirits made from unused citrus residues

> Filed two patent applications related to fermentation materials using unused resources

Oct.



> Completed construction of a new factory utilizing a closed kindergarten in Oshu City

> Collaborated with a non profit organization,Oshu Isawakai for product manufacturing

Nov.

> Won the Tokyo championship at Culinary Action! On The Road Fourth Edition

> Developed products in partnership with Kameda Seika through unused resource regeneration and circulation collaboration

Dec.

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Impact Certification

As a Company Pursuing Both Business and Social Value

At Fermenstation, we leverage external frameworks and mechanisms, as outlined below, to pursue a business model that integrates both commercial viability and social impact.

J-startup Impact

The Ministry of Economy, Trade and Industry (METI) launched the “J-Startup Impact” program to support high-potential impact startups. Fermenstation was selected as one of 30 companies expected to serve as role models. Impact startups are gaining attention as “companies that aim for both the resolution of social and environmental challenges or the realization of new visions, and sustainable economic growth.”
https://www.j-startup.go.jp/startups/165-fermenstation.html

B Corp Certification

B Corp Certification is an international certification originating in the U.S. awarded to companies that create a positive impact for their stakeholders, including the environment, workers, customers, and communities. It provides objective metrics, through the “B Impact Assessment,” for both the outcomes and initiatives related to business and social performance. Furthermore, a triennial re-assessment offers opportunities for regular checks and re-evaluation. Fermenstation obtained this certification in March 2022. Our first renewal is due in 2025, and we are currently undergoing re-assessment. In Japan, there’s also an exploration of mechanisms for companies to form communities and mutually support each other towards the shared goal of social impact. Beyond just acquiring the certification, we pursue social impact by learning from one another as colleagues working towards the same objective. B Corp is one of the important communities for our company.
You can check our B Impact Score here: https://www.bcorporation.net/en-us/find-a-b-corp/company/fermenstation-co-ltd

Unreasonable impact in partnership with Barclays

A program that confronted us with the true power of social impact: Unreasonable Impact by Barclays

A program that shows seriousness about social impact

text by Mari Minakuchi

"The reasonable man adapts himself to the world; the unreasonable one persists in trying to adapt the world to himself. Therefore, all progress depends on the unreasonable man."

These are the words of George Bernard Shaw, the British playwright and Nobel Prize in Literature laureate. It is precisely those on the side of "persistence" who take on the challenge of changing society.

Fermenstation CEO,Lina,encountered this quote when participating in a program for social entrepreneurs hosted by Unreasonable Group in collaboration with global financial group Barclays. Since its launch in 2016, the program has supported over 350 companies around the world.

Lina participated in a program called "Unreasonable Impact by Barclays", where social entrepreneurs from growth-stage companies across various countries spent a week together, living, eating, and sharing their visions and ideas. As its name suggests, "Unreasonable" means irrational or unconventional. This particular session, targeting the Asia-Pacific region, was held on a remote island in Malaysia, bringing together entrepreneurs from Japan, India, Hong Kong, Singapore, Australia, and beyond.

"What matters is not competition, but co-creation. The bigger the issues we face, the less they can be solved through competition alone. Let's focus on how many problems we can tackle together."

These words came from Daniel Epstein, founder of the Unreasonable Group, who leads the program. Creating social impact through business is a challenge without clear answers. His unwavering commitment to fostering mutual support among like-minded entrepreneurs — so they can achieve even greater results together — has resonated deeply with many of the participants.

The program's emphasis on co-creation is reflected throughout its design. For example, in the many dialogue sessions held among participants, there is a strong emphasis on being a good listener. This shifts people's perspectives away from "how great my business is" to "what can I do for others".

"I think it's rare to find a program with such a naturally altruistic atmosphere," Lina recalls.

This spirit of "we are all partners tackling social issues together" extends to relationships with investors as well. Toward the end of the weeklong program, participants have the opportunity to present their businesses to a group of investors gathered from across the region. Even then, the investors are explicitly asked not to judge or criticize the entrepreneurs.

"In the Unreasonable Impact program, the phrase 'We over I' is repeated like a mantra," Lina notes. "Even the relationship between entrepreneurs and investors is about 'We.'"

The richness of the community of social entrepreneurs supported by the program — and the closeness among its members — is also remarkable. While the areas of focus and business fields vary widely, from climate change and food to healthcare, resources, and education, the Unreasonable Impact community is made up of leading entrepreneurs from each of these sectors.

Moreover, the program operates under a unique philosophy: "Once an entrepreneur joins the community, they receive lifelong support." A dedicated app has been developed, allowing members to easily connect with one another or with mentors whenever they need advice or support.

"One of the most memorable things Daniel said was, 'Thank you for sticking with what people may call unreasonable for so long. But in this fast-changing world, it's precisely you unreasonable people who can drive real change,'" Lina recalls.

While startups are typically expected to deliver quick results, generating meaningful social impact inevitably takes time. The ongoing encouragement that Unreasonable Impact offers to entrepreneurs facing this tension provides valuable insight into the evolving relationship between business and social issue-solving — and into what true growth might really mean.

Voices from Stakeholders

Value Books Co., Ltd. CEO
Nozomi Torii

Nozomi Torii

When I had the opportunity to visit Oshu Lab in the fall of 2023, through conversations with the people around me and the landscape, I felt that it embodied the B Corp™ Interdependence Declaration, which states, “We are the change we strive for. We operate every business as a force for creating a better society.” I am pleased to be able to foster a global economy together with you as a fellow B Corp.

Executive Officer, General Manager of Business Management Division, Takara Holdings Inc.
Kei Sato

Kei Sato

Through our collaboration with Fermenstation, we have developed the key ingredient, “Citrus Peel Fermented Spirits,” that delivers a satisfying drinking experience in the canned chuhai Takara “Fermented Distilled Sour” — even with just 3% alcohol content.
The ability to create this key ingredient from citrus peels that would otherwise be discarded is a testament to Fermenstation’s expertise in upcycling a variety of unused resources.
We look forward to continuing our joint efforts to create new value from unused resources.

Tatsuya Noda

A chef’s role is to prepare and serve ingredients — and by its nature, it’s a profession based on consumption. While we are constantly mindful of minimizing waste and making full use of ingredients, I’ve also come to realize how difficult it is to regenerate resources in a way that meaningfully benefits society and the environment. In that context, I was deeply inspired by Fermenstation’s upcycled essences created from food residues. I felt the potential for value creation that goes beyond mere regeneration. As a chefs, I believe we too must become part of this circular movement, working together to create a delicious future for both people and the planet.

President & Chef, PLUM KNOT Inc.
Tatsuya Noda

Akanksha Khurana

Fermenstation holds great potential to drive significant transformation. It is a true pleasure to support them on this journey, and Lina and the entire Fermenstation team look forward to advancing to the next stage of growth.
We expect them to continue pushing the boundaries of sustainability and innovation with an “unreasonable” mindset — because all progress is driven by the unreasonable.

Portfolio Manager, Asia Pacific, Unreasonable Group
Akanksha Khurana

Director, CIC Institute
Masaru Nagura

Masaru Nagura

Major global brands and manufacturers in the fashion, beauty, and related industries — particularly those focusing on sustainability — have recognized and highly valued Fermenstation’s technology. I believe that the low environmental impact, high-value-added compounds produced through their fermentation technology will increasingly be integrated into supply chains across numerous industries worldwide. As a role model for globally active startups, I look forward to seeing Fermenstation achieve even greater, breakthrough growth in the coming years!

CEO, Impact Capital Inc.
Chunmei Huang

Chunmei Huang

Fermenstation is a prime example of balancing impact and business by aiming to build a society that regenerates and circulates unused resources through unique fermentation technology.
Through the continuously evolving impact reports, we are able to clarify the path toward realizing our purpose with high resolution, visualizing our activities and outcomes, which directly contributes to improved management. This will also serve as a valuable guidepost for other companies. We actively contribute case studies and other initiatives to foster the formation of an impact ecosystem, making us a reliable and encouraging partner in the impact community.

Fermenting
a
Renewable Society

Impact Model

A New Impact Model Aiming for the “Next Normal”

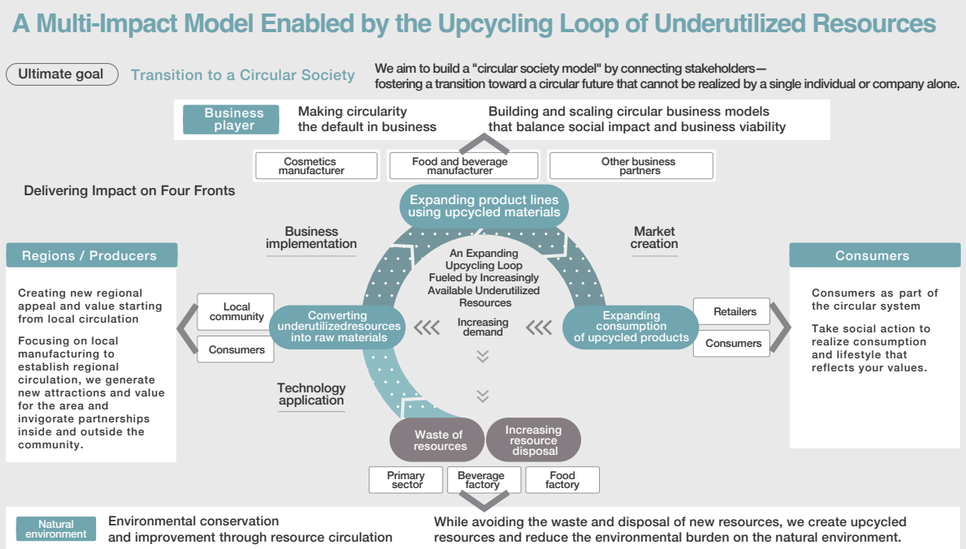
Introduction

The core of Fermenstation’s business lies in upcycling unused resources through fermentation technology. Our aim is not only to continuously upcycle resources through our business, but also to create a virtuous cycle in which diverse stakeholders understand the significance of upcycling and proactively utilize unused resources.

Until 2023, the impact creation model we advocated was the “Unused Resource Upcycle Loop” shown below.

*Impact model: A logical model that shows the creation of social impact

A Multi-Impact Model Enabled by the Upcycling Loop of Underutilized Resources



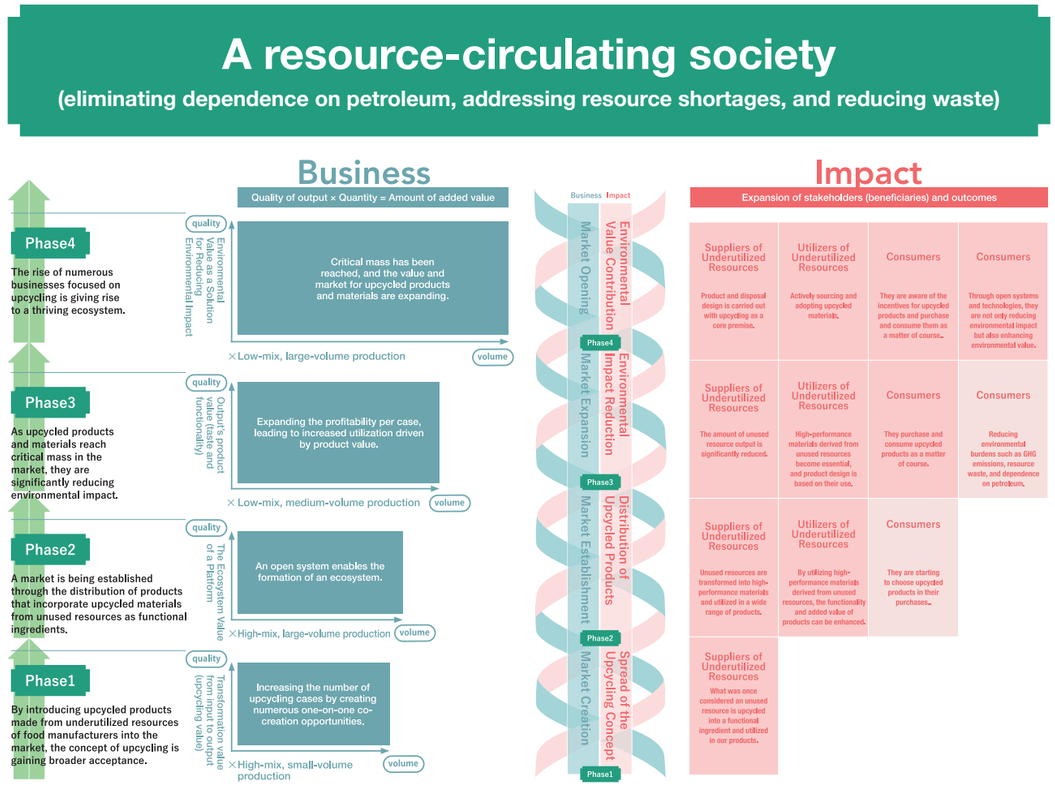
This upcycle loop diagram represented the multifaceted impact creation that aligned with the business model we had followed up to 2023.

However, as an evolving startup, we began to feel the need to refine our impact model. While our ultimate goal and underlying philosophy remain unchanged even amid changes in our business model and target market, we recognized the necessity of updating the impact model to better suit current and future changes.

In 2024, we launched a full-fledged review of our impact model and goal setting to ensure it aligns with long-term impact creation. As a first step, we developed a trial version (Ver. 0).

1 Impact Model

“Impact Model Beta” Phase close-up



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Business and Impact Phases

The diagram above shows the progressive changes in business (left) and impact (right) as the business evolves, along with the expansion of scale in each area.

A key point in developing the new impact model was shifting away from the static expression of the previous loop diagram and creating a dynamic model that incorporates a time axis.

Our work in upcycling unused resources begins by spreading the concept itself and redefining what was once considered waste as valuable resources.

This includes actions such as sorting waste as resources in food factories, designing products and production lines with upcycling in mind, and even changing legal regulations. It involves dismantling existing frameworks and working with stakeholders to update entire systems.

In pursuit of ambitious outcomes, both in business and in impact, rather than attempting to overturn systems in one leap, we have defined four phases. This approach enables us to identify outcomes to be achieved at each step.

A feature of our impact model is that, as we progress through each phase, both the types and the scale of beneficiaries expand on both the business and impact sides.

A resource-circulating society

(eliminating dependence on petroleum, addressing resource shortages, and reducing waste)

Business

Quality of output × Quantity = Amount of added value

Phase4

The rise of numerous businesses focused on upcycling is giving rise to a thriving ecosystem.

quality — Environmental Value as a Solution for Reducing Environmental Impact

Critical mass has been reached, and the value and market for upcycled products and materials are expanding.

× Low-mix, large-volume production — volume

Phase3

As upcycled products and materials reach critical mass in the market, they are significantly reducing environmental impact.

quality — Output's product value (taste and functionality)

Expanding the profitability per case, leading to increased utilization driven by product value.

× Low-mix, medium-volume production — volume

Phase2

A market is being established through the distribution of products that incorporate upcycled materials from unused resources as functional ingredients.

quality — The Ecosystem Value of a Platform

An open system enables the formation of an ecosystem.

×High-mix, large-volume production — volume

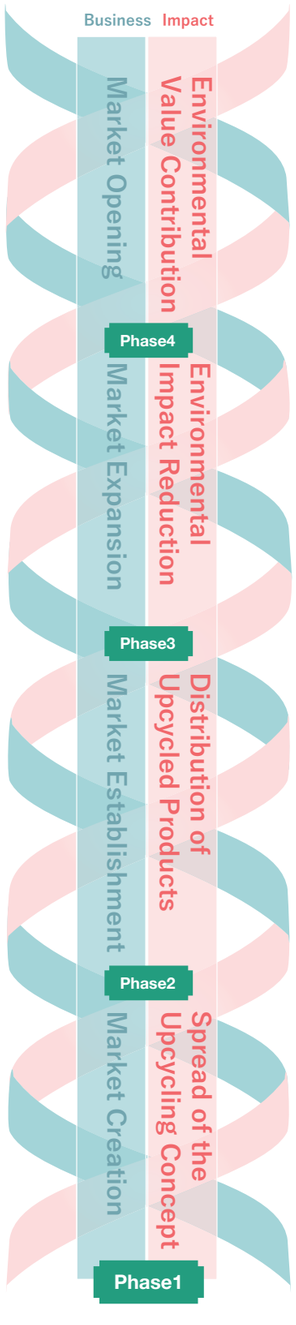
Phase1

By introducing upcycled products made from underutilized resources of food manufacturers into the market, the concept of upcycling is gaining broader acceptance.

quality — Transformation value from input to output (upcycling value)

Increasing the number of upcycling cases by creating numerous one-on-one co-creation opportunities.

×High-mix, small-volume production — volume

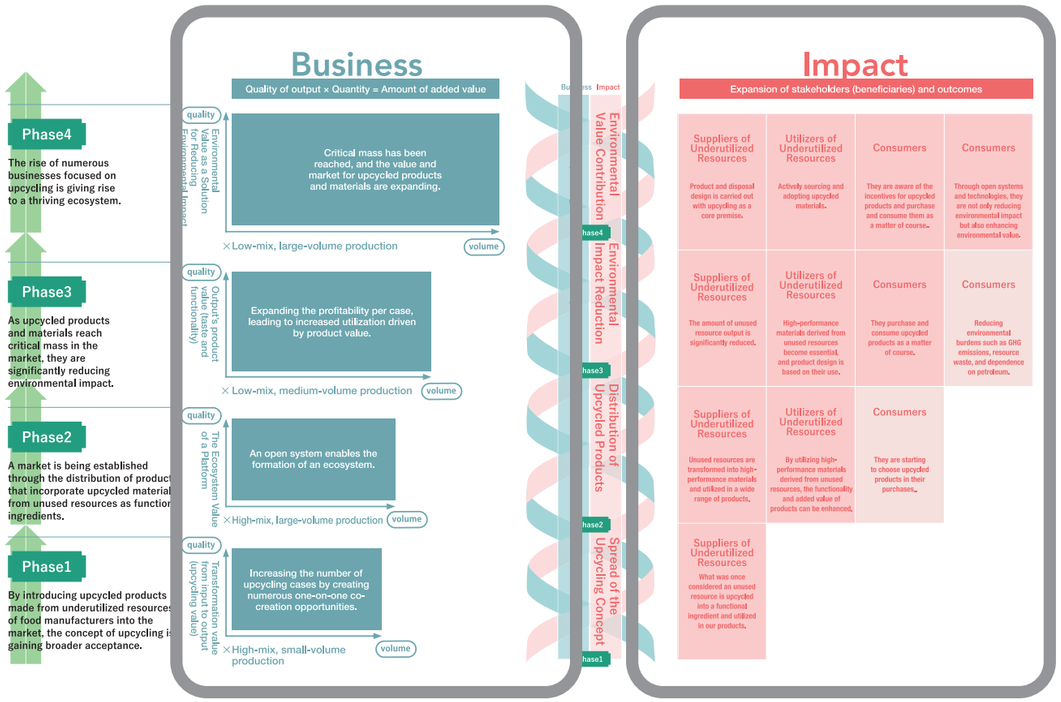


Impact

Expansion of stakeholders (beneficiaries) and outcomes

Suppliers of Underutilized Resources Product and disposal design is carried out with upcycling as a core premise.	**Utilizers of Underutilized Resources** Actively sourcing and adopting upcycled materials.	**Consumers** They are aware of the incentives for upcycled products and purchase and consume them as a matter of course..	**Consumers** Through open systems and technologies, they are not only reducing environmental impact but also enhancing environmental value.
Suppliers of Underutilized Resources The amount of unused resource output is significantly reduced.	**Utilizers of Underutilized Resources** High-performance materials derived from unused resources become essential, and product design is based on their use.	**Consumers** They purchase and consume upcycled products as a matter of course.	**Consumers** Reducing environmental burdens such as GHG emissions, resource waste, and dependence on petroleum.
Suppliers of Underutilized Resources Unused resources are transformed into high-performance materials and utilized in a wide range of products.	**Utilizers of Underutilized Resources** By utilizing high-performance materials derived from unused resources, the functionality and added value of products can be enhanced.	**Consumers** They are starting to choose upcycled products in their purchases..	
Suppliers of Underutilized Resources What was once considered an unused resource is upcycled into a functional ingredient and utilized in our products.			

“Impact Model Beta” Phase-up diagram



Business Phase-Up Diagram

On the business side, the diagram expresses phase progression in terms of the area represented by the quality of added value provided × the volume of unused resources utilized.
The vertical axis represents the quality of value provided, and the horizontal

Impact Phase-Up Diagram

On the impact side, the diagram shows the beneficiaries in each phase and the outcomes we aim to bring to them. It mirrors the business phase progression, showing an expansion in both beneficiaries and outcomes.

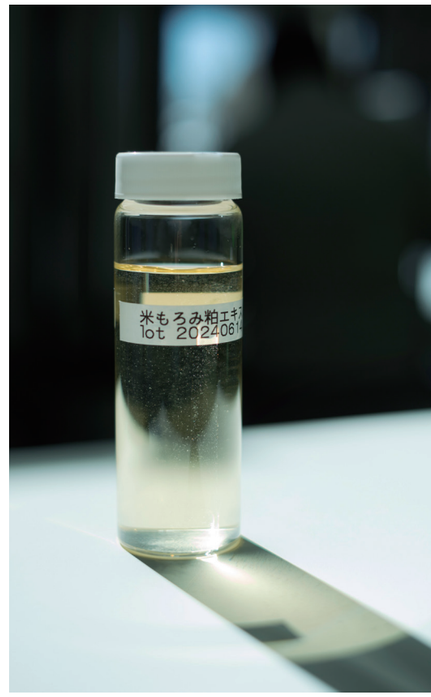
Business

Phase1 Market Creation

In this phase, we purchase unused resources from emitters (mainly food and beverage manufacturers) and upcycle them into functional ingredients, which are then developed and manufactured into products by the emitters and delivered to consumers. By creating numerous 1:1 examples where the resource emitter also uses the upcycled product, we increase the diversity of applications and work to spread the concept of upcycling in society.

Phase2 Market Establishment

Here, we envision N:N applications in which functional ingredients made from unused resources purchased from one emitter are used by another business. By achieving higher value-added ingredients and enabling more generalized upcycling through product value, we increase opportunities for consumers to encounter upcycled products.



Phase3 Market Expansion

This phase focuses on reducing environmental impact through increased utilization of unused resources. Once the use of upcycled materials becomes mainstream and reaches critical mass, we begin to see significant environmental impact reductions.

Phase4 Market Opening

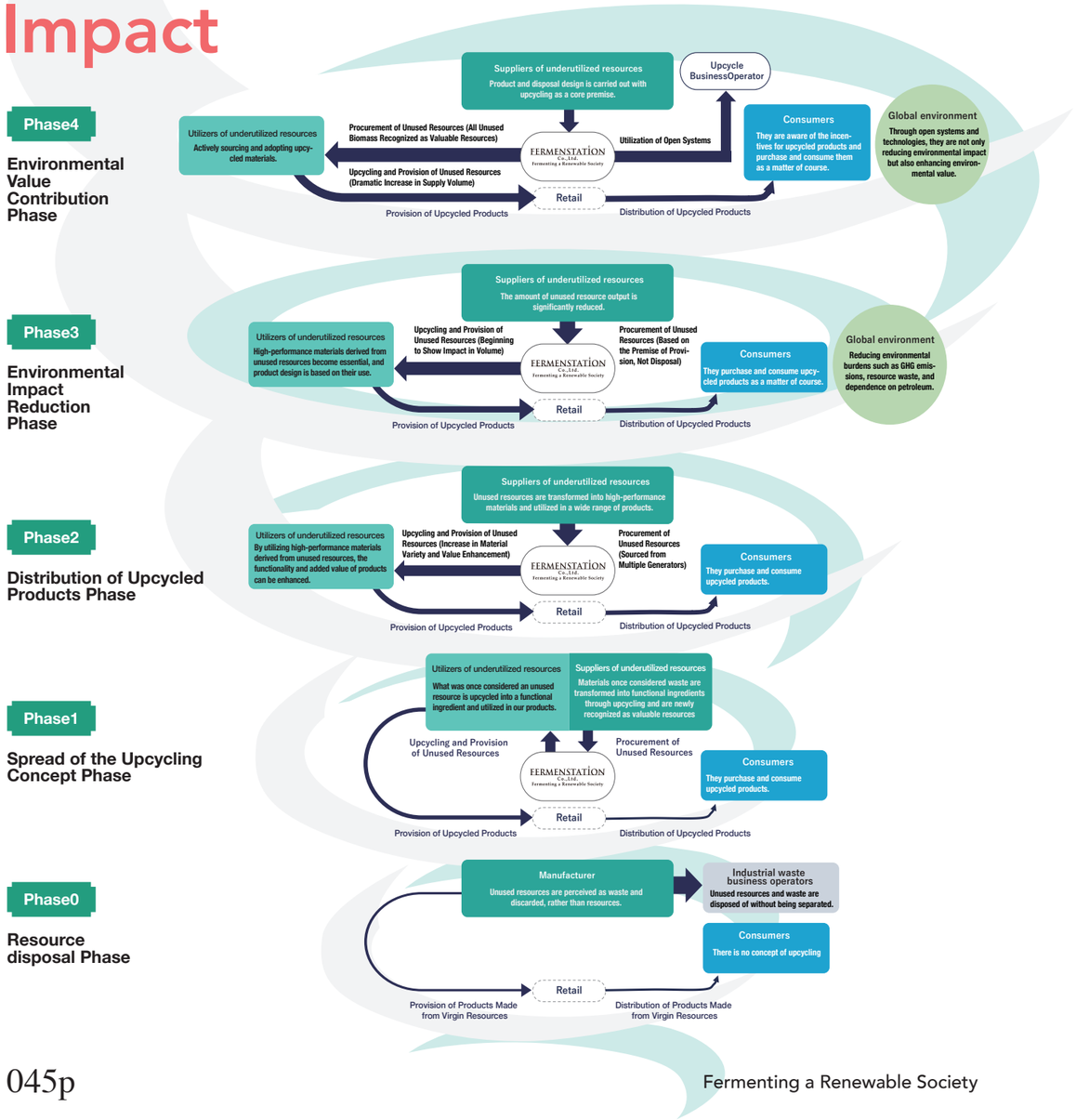
Our technological foundation becomes a platform, forming an open system and collaborating with other upcycling companies to build an upcycle ecosystem. This enables us to generate a comprehensive, cross-company impact, increasing environmental value and getting closer to the final outcome. Achieving the next “normal”—a circular society—requires the involvement of many stakeholders.

Impact Model 2

“Impact Model Beta” System Change Diagram

A resource-circulating society
(eliminating dependence on petroleum, addressing resource shortages, and reducing waste)

Impact



The second diagram cuts out the impact side of the phase-up diagram and illustrates the supply chain surrounding unused resources for each phase.

As we spiral upward through the phases, the supply chain becomes more robust, leading to new norms and societal advancement. The diagram shows how Fermenstation’s presence updates the way resources are discarded and consumed, through a step-by-step system change in the supply chain.

For example:

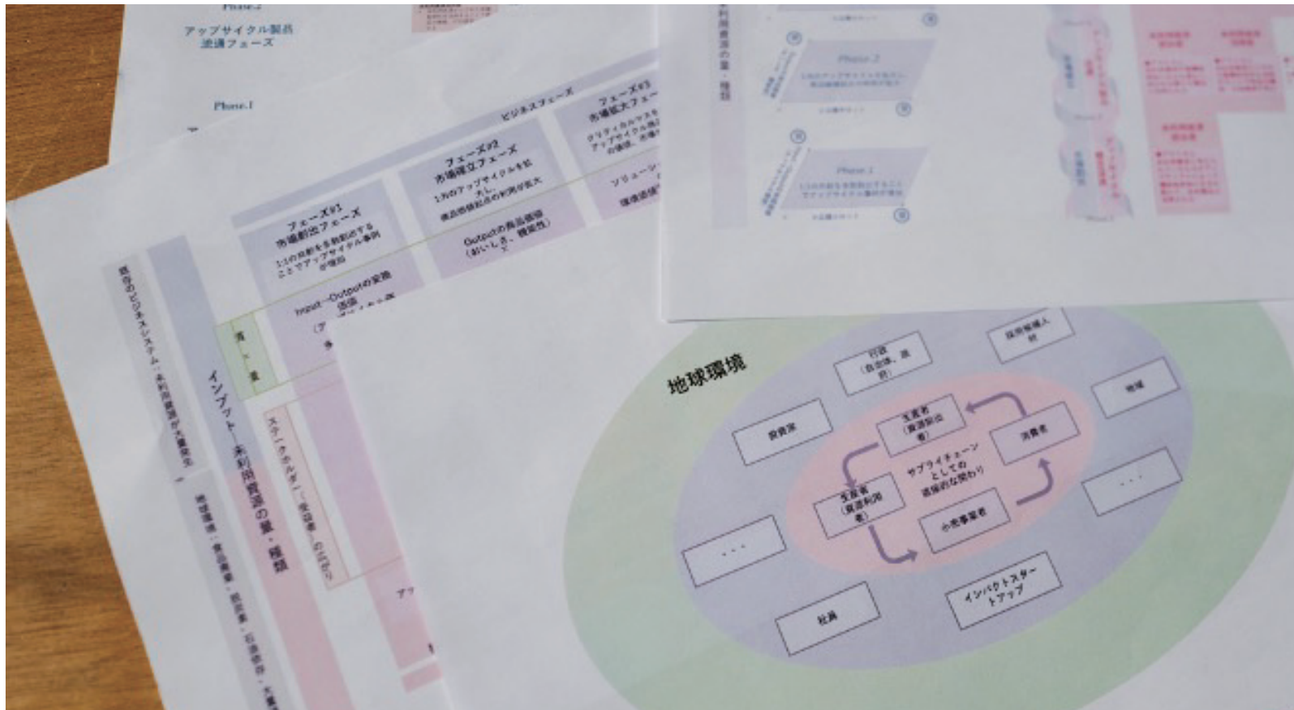
- Phase 0 (Pre-Fermenstation): Resources are simply discarded.
- Phase 1: Resources begin to be used, converted into raw materials, and released as finished products into the market.
- Phase 2: Emitters and users become different businesses, shifting from 1:1 utilization to N:N.
- Phase 3: The amount of resources utilized increases (shown by thicker arrows), creating significant environmental impact.

Next steps for the Impact Model

As this is a β version, the impact model leaves room for change and evolution.

In 2025, we will compare the impact model and phases with our actual business practices, ensuring that it resonates with our experience and reality. We will also refine the model with feedback from external stakeholders.

Additionally, we plan to establish KPIs for each phase based on this impact model and begin monitoring progress as the next step.



Fermenting a Renewable Society

Summary of 2024

Toward the Future of Impact Management: Reflections and Challenges
Looking back on 2024, it was a year in which we took stock of Fermenstation's impact-related initiatives to date and took the first step toward evolving to the next stage.

1 Business Development

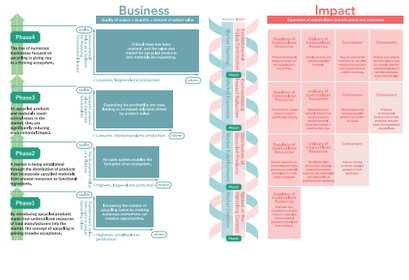
Building a foothold from market creation to market establishment

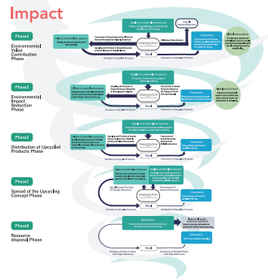
While maintaining our unwavering focus on upcycling unused resources, we accelerated technology development and business co-creation, particularly in the area of food and beverage ingredients. Aimed at entering larger markets, we were able to drive forward Phase 1 (Market Creation Phase) of the new impact model introduced in this report and lay the groundwork for Phase 2 (Market Establishment Phase). With the expansion of our business in the food and beverage sector, it was a year in which we envisioned a future capable of creating even broader and yet more meaningful impact.

2 Refining the Impact Model

Developing an impact model that connects business and social impact

In 2024, we worked to refine the initial version of our impact model, which we introduced in our first report published in 2023. To accommodate the continuous, dynamic business evolution characteristic of a startup, we evolved the model into one where impact itself develops in stages. By visualizing the interaction between business activities and impact — and the outcomes generated by each in different phases — we created a more concrete framework connecting business value with social value.
By first establishing a qualitative model, we laid the foundation for quantitatively measuring impact as much as possible and verifying progress in a structured way.





3 Incorporating External Perspectives

Consideration of medium- to long-term market and social issues

Externally, we participated as an impact startup in the Impact IPO Working Group organized by GSG Impact Japan, contributing to the formulation of the "Guidance for Impact Companies on Information Disclosure and Dialogue in Capital Markets: First Edition." This provided us with valuable opportunities to consider how we present our social issue focus areas, business narratives, impact models, and stakeholder dialogues — all with an awareness of the market conversations we will inevitably face in the future.
It also allowed us to gain perspective on challenges that may emerge from future stakeholders we have yet to engage with, and to approach issues from a long-term, backcasting perspective.

Source: "Impact IPO Working Group Meeting" | GSG Impact JAPAN

Looking Ahead

Adaptation

as a Key Concept for the Future of Impact

Looking ahead to 2025 and beyond, we believe that adaptation will become an essential keyword in order to continuously generate meaningful impact while flexibly responding to a rapidly changing environment.

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Adapting to Changes in the External Environment

As society moves toward achieving major social impacts — such as the realization of a carbon-free society — the presence of startups addressing social issues is becoming increasingly normalized. A symbolic sign of this shift is the number of full members of the Impact Startup Association surpassing 200, making it the largest startup-related association in Japan.

While this represents a positive and growing movement, it also signals the commoditization of “social impact.” As a result, critical questions are beginning to surface around what true impact really means, as well as the depth and authenticity of the connection between business and impact.

For us as a company, securing the people, resources, and co-creation partners needed to achieve our intended impact will demand even clearer articulation of our distinctiveness and our why — why we pursue these particular businesses and issues.

By continually posing these questions to ourselves, we aim to stay at the forefront of exploration, presenting new challenges and experimental model cases for the broader ecosystem.

Adapting to Changes in Our Business

While upcycling unused resources remains our core focus, we are now at a stage where the weight of our business areas, output types, and target markets is shifting. Moving forward, we plan to pursue business and technology development with an eye on international markets as well.

A key challenge will be how to dynamically align these business changes with our impact model and integrate them into our daily operations.

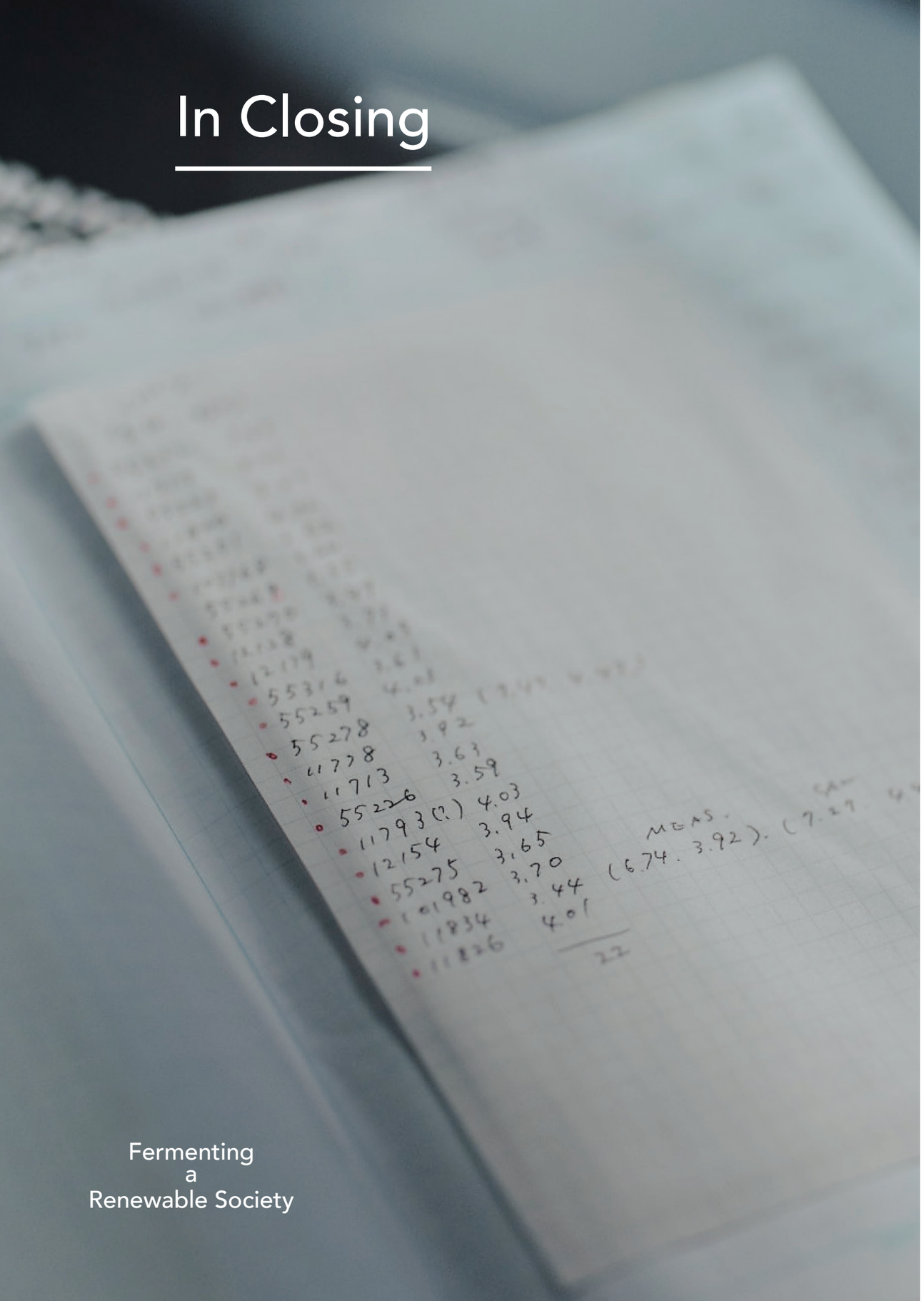
Based on this dynamic relationship between business and impact, it will be essential to establish appropriate quantitative monitoring methods and to promote the quantification of our impact in parallel with business growth.

Adapting to Changes in Our Organization

As our business grows, so too does the size of our organization. Until now, we have promoted impact initiatives through an “all-hands” approach within a relatively small team, where people collaborated beyond roles and titles. However, we increasingly recognize that it is becoming difficult for everyone to be involved in the same activities at the same time.

To continue growing as an organization while preserving our collective passion for impact and integrating an impact-oriented mindset into each individual’s daily work, we believe it’s time to rethink and rebuild how we engage with impact initiatives.

In Closing



“Business and Impact”
“Global and Local”
“Sensibility and Logic”
“Speed and Substance”

Looking at perspectives across different fields,
Aiming for the ultimate goal”

Thank you for taking the time to read our Impact Report.
The year 2024 brought significant changes to both our business and organization, making it a year that called for major updates—not only to our impact model, but to the report itself.
Last summer, we launched an internal project team and began working on this report in parallel with the development of a new impact model. Throughout this process, we grappled with difficult, open-ended questions: Who are we trying to reach through this report, and what do we want to convey? How much complexity and ambiguity should we allow? At what level of abstraction should we express our ideas?
As we confronted these challenges without clear answers, we consistently sought to identify the essence of what mattered, exchanged ideas, and experienced moments of clarity that sparked excitement. Over the course of several months, we repeatedly refined our language and visualizations through trial and error.
One of the major differences from our previous report was that the responsibility for this project was delegated from our executive team to a member in charge of driving our impact initiatives. Under the leadership of the project manager, team members across different locations collaborated to bring this report to life — from organizing photoshoots at each site to taking on writing responsibilities for selected articles.
True to our startup spirit, even while everyone was fully occupied with their core business and operational duties, we reaffirmed that our organization is one where people can still devote genuine passion and resources to creating an Impact Report of this caliber. It was a moment that reminded us once again of the strength and pride we take in our team.
Our company is still on a journey of growth and evolution — both in business and in creating impact. As reflected in the updated values we established in 2024, we aim to reach our goals not by taking the shortest or most conventional path, but by navigating between seemingly contrasting domains: business and impact, global and local, intuition and logic, speed and substance.
As a startup taking on ambitious challenges, we look forward to sharing even greater achievements in next year’s Impact Report. With that in mind, we will continue to advance our business and impact initiatives every day.
Lastly, I would like to express my heartfelt gratitude to everyone who contributed to the creation of this report — to those who took charge of editing and creative direction, to the experts who offered valuable advice, to the communities engaged in social impact, to all of our supporters, and to our colleagues both inside and outside the company who continue to pursue both business success and social value alongside us.
Thank you very much.

Shota Kitabatake
Director & COO

Photograph by Eichi Tano(Tokyo) , Yui Sugawara(Oshu)　Design by EISU(RIDE Inc.)　Direction by Atsushi Koda (RIDE Inc.)