Global Impact Investment Fund (Climate Change)

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Impact Report

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Fund formulator and administrator

Resona Asset Management

Company name: Resona Asset Management Co., Ltd. Registration no.: Director of Kanto Local Finance Bureau (financial instruments business operator) No. 2858 Association membership: The Investment Trusts Association, Japan Japan Investment Advisers Association

Before investing in our products, please make sure to read the latest version of the Investment Trust Explanation Document (Prospectus) and its Supplementary Materials.

Introduction

—Resona Asset Management's approach to global impact investment (climate change)

The Global Impact Investment Fund (climate change) was formulated in December 2021 with the aim of achieving a "sustainable world where climate change and its effects do not pose a threat to anybody's life or health."

Climate change arising from global warming now constitutes the most serious problem of the 21st century and poses a threat to our daily lives. Resona Asset Management understands the urgency of this growing issue.

In response, we will practice impact investment to support the resolution of climate change-related issues by empowering excellent corporations around the world to do so. Through this, we will provide abundance and happiness to future generations.





A Message from the Chief Portfolio Manager

The Global Impact Investment Fund (climate change) was formulated to achieve a "sustainable world where climate change and its effects do not pose a threat to anybody' s life or health."

Our commitment to achieving this goal is unwavering.

The climate change problem has been widely known for decades and repeatedly discussed in diverse corners of society. Taking a look at the recent condition of the global environment, however, it is clear that this problem is going from bad to worse. When I was a child, people didn' t need to turn on the air conditioning to cool the bedroom at night. Even in summer, we were able to sleep soundly with the cool breeze from the window as the temperature naturally went down after sunset. Today, however, a lack of air conditioning in summer could result in life-threatening situation. The status of the Earth's environment has changed in such a drastic way over the course of just several decades, less than the lifespan of one generation. What will happen in ten or twenty years going forward? Can we ensure that our world will still be habitable when our children and grandchildren grow into adults?

Rising global temperature is not the only problem confronting us. Climate change is now feared to induce a broad range of other issues. These issues, ranging from the shrinkage of regions habitable to humans, depletion of food and water, pandemics of infectious diseases, to eruption of international conflicts over resources, could emerge in a chain reaction. Taking these factors into account, the climate change problem is a matter of the utmost importance for humanity and must be countered at all costs.

Of course, we know that resolving this problem is no simple task. We also understand that many people do not believe that it can be resolved. However, should we fail to take serious action now, we will soon find ourselves running out of time. We would quickly reach the point of no return if we idly remain bystanders. I am convinced that we have no other choice in the face of this perilous situation.

I love the world around me. I am grateful not only to the natural environment but also to society, as well as my friends, family members and all others who came into my life and helped form who I am now.

Impacts we are aiming for



Reduce greenhouse gas (GHG) emissions, which cause climate change Achieve net-zero GHG emissions around the world earlier than 2050

Source: Compiled by Resona Asset Management in reference to the outline of the Glasgow Climate Pact agreed upon at COP26 in November 2021

Adaptation to climate change Mitigate risks arising from climate change

Address climate change-related issues affecting high-risk regions, including developing countries Focus especially on providing vulnerable regions and communities with long-term solutions for adaptation



I am also aware that my existence is in large part attributable to the baton my predecessors have passed down to our generation. Guided by my immense sense of gratitude, I am determined to carry this baton of life to the next generation. I personally believe that this task is integral part of my responsibilities. The succession of the baton should be protected in this generation.

Fortunately, our society is beginning to change in a positive way. For example, we have seen growing public awareness regarding the pressing need to address social issues, especially among the younger generation, Gen Z. This generation will one day become the majority. Their voting and purchasing behaviors will then serve as driving forces behind major social transitions. Furthermore, technological breakthroughs currently achieved in various fields could provide a basis for the near-future realization of innovative solutions, which were previously considered pipe dreams. I believe that our mission is to nurture these new seeds of hope by developing seedbeds for, providing fertilizers to and watering them so that they can sprout and grow into large trees.

Traditionally, finance has assumed the role described previously to support social development. I believe that the emergence of the impact investment framework was inevitable in the wake of the climate change problem—a universal crisis for humanity. Impact investment provides a scheme for people around the globe to invest with intention and, through various funds, direct finance to corporations and empower them to realize innovation. This will, in turn, result in major social impacts. These impacts will not only enrich society and enable businesses to grow but also help investors enjoy robust returns. We expect a virtuous cycle like this to attract a greater number of human resources along with a growing volume of investment and, eventually, generate a wave that will transform society.

To make this happen, we have just made a small but solid step. The Impact Report is our first message conveying our steadfast commitment in this area. It is our great hope that you take time to read through it and understand our aspirations. I couldn' t be happier if this publication earned us an ally to our pursuits. Looking ahead, we would like our stakeholders to expect great things from our activities.

Hiroki lura Chief Portfolio Manager Global Impact Investment Fund (climate change)



Resona Asset Management's purpose and intention for its global impact investment (climate change)

Resona Asset Management's purpose is to "provide abundance and happiness to future generations as well as our own." We strive to not only help our investees operate sustainably but also believe that contributing to the sustainability of society and the environment, both of which serve as foundations for their corporate activities, will position us to better protect the assets our customers entrust to us. These endeavors are, of course, also intended to support sustainability for all customers.

The Global Impact Investment Fund (climate change) (hereinafter the "Fund") has defined its intention as "achieving a sustainable world where climate change and its effects do not pose a threat to anybody's life or health." Climate change constitutes the most important issue in terms of maintaining social sustainability. Accordingly, addressing this problem is integral to the realization of abundance and happiness for future generations. We will therefore serve, over the long term, as a running partner for our investees striving to address climate change. In this way, we will realize our purpose.

What is impact investment

Resona Asset Management considers impact investment to be an important method of providing abundance and happiness to future generations as well as our own.

Investment in general, the primary purpose of which is to acquire investment return, involves assessments from two aspects: return and risks. In addition to these, impact investment incorporates a new axis for assessment, namely, impact. Impact refers to a positive social impact, such as contributing to the resolution of social and environmental issues.

Executing investment means providing investees with financial and monetary support to aid in their corporate activities. In this light, impact investment is considered to directly contribute to the creation of a better society as this method is typically employed by investors who maintain clearly defined intention regarding what impact they seek to make and have developed careful assumptions about the possible impact of activities undertaken by their investees candidates in the course of screening them.

In the course of impact investment, the Fund also employs an investment approach equipped with the following three features: 1) long-term, selective investment; 2) impact measurement and reporting; and 3) dialogue and engagement with investees. In these ways, we will provide customers with opportunities to support the resolution of social issues through investment while acquiring attractive return.

Investment fields of the Fund

Resolving social issues with the power of business

- The accumulation of human resources, management resources and technologies is expected to generate synergetic capabilities and lead to major progress in efforts to resolve social issues.
- The spillover effect is also expected to emerge and impact a variety of social fields via, for example, the creation of employment and the innovation of industrial norms.

Supplementary relationship





Resolving social issues through donations and public policy

• This method is capable of supporting the resolution of issues in fields that are incompatible with business activities as it is solely backed by contributors' moral compass and benevolence.

• This method is also expected to contribute to social stability through the redistribution of income.

Resona's impact investment **Feature**

Resona's impact investment

Feature

Acquiring return through long-term, selective investment

Although there are many social issues that call for solutions, most of them are inherently hard to be resolved in the short term, constituting serious, complex and structural problems. Moreover, only a handful of entities are equipped with abilities to provide effective solutions. These circumstances, in turn, make it difficult to make immediate improvement and mitigate the seriousness of these issues.

On the other hand, innovation achieved by business corporations through technological breakthroughs or other creative activities is becoming the subject of growing public expectations. A corporation that overcomes barriers to the resolution of a given issue and delivers effective solutions would be better positioned to meet abundant business opportunities as it stands out in the market, with its corporate value thus growing sustainably.

Taking a strictly selective approach to screen investee candidates from among excellent corporations like the one exemplified above, the Fund assists them in their efforts to resolve social issues through impact investment. At the same time, we are confident that we will be able to acquire robust returns over the long term as a result of investees' business growth.



Making it easier to visualize the value of investment through impact measurement and reporting

In the course of impact investment, the Fund not only aims to acquire robust return but also considers making a positive impact its important objective. Accordingly, we place great emphasis on periodically assessing what impact our investees have made and measuring the magnitude of such impact. Based on the results of this measurement, we provide our customers with reports on investee status so that they can clearly see the impact of their investment.

When conducting impact measurement, we set quantitative indicators designed to determine the degree of achievement of investment goals and the status of issues we aim to resolve. In addition, we carry out qualitative assessments, such as examining actual cases of investee initiatives, as part of periodic assessments.

We will continuously strive to help our customers clearly understand how their investment contributes to the betterment of society, to this end robustly updating them about the status of our investees and their business activities supported by customer funds. Improvement of strategies Impact measurement Impact Report

Resona's impact investment Feature

Assisting investees in their corporate activities through dialogue and engagement

In order to secure targeted returns through long-term investment as we create a positive impact, we deem it important to assist investees in their business activities aimed at making impacts. This is why we focus on maintaining dialogue and engagement with them.

Impact investors do not consider investee corporations a mere vehicle for acquiring returns. Rather, such investors expect their investees to create a positive impact and, therefore, pay close attention to value they can deliver to society through corporate activities. The investment philosophy of this kind could be highly compatible with corporate philosophies, reasons for being and purposes defined by investee corporations whose focus is to make a positive impact on society. With this in mind, we put ourselves on equal footing and aim for the common goals with investee corporations, believing that serving as their running partner is a matter of extreme importance in maintaining constructive dialogue and engagement with them. As an impact investor, we are confident that this approach will enable us to be recognized by investees as standing out among other general shareholders due to the uniqueness of our investment philosophy. This will, in turn, help us develop favorable relationships of trust and maintain meaningful dialogue and engagement with them.



> An impact fund aimed at contributing to countermeasures against global climate change risks

Global climate change risks

The world population is now expected to increase considerably due especially to population growth in India and sub-Saharan Africa. This increase will, in turn, cause demand for resources and energy to surge on the back of burgeoning economic development in emerging nations. Moreover, the volume of GHG emissions worldwide is likely to grow constantly going forward in step with the expansion of economic activities around the globe if robust reduction measures are not taken. Simultaneously, if widening economic divides among countries and regions remain unmitigated and hamper effective international cooperation, poverty and other relevant issues may not be addressed effectively, and regional disparities in technological innovation may increase further.

The Intergovernmental Panel on Climate Change (IPCC) forecasts that the breadth of the current rise in average global temperature will surpass 1.5°C, or possibly even 2°C, by the end of this century unless the volume of GHG emissions decreases significantly over the course of the next several decades. It is believed that climate change induced by human activities as described above will

What is needed to realize a sustainable world

To avoid serious risks arising from climate change, it is essential to resolve its root cause. Specifically, mitigation measures, which aim to rapidly reduce GHG emissions globally, must be undertaken. Also, it is estimated that a 1.5°C rise in global temperature at the end of this century cannot be avoided even if the best possible countermeasures are introduced. In the worst-case scenario, the temperature rise may reach 4.4°C. Accordingly, implementing adaptation measures, which are designed to enhance society's resilience against climate change, is equally important as mitigation measures.

In this regard, we have developed the "Theory of Change"* to outline the approach the Fund intends to take in its pursuit of a sustainable world.

One example of mitigation measures is reducing the use of fossil fuels as an energy source to support human social activities. To this end, electrification should be implemented thoroughly. At the same time, conventional energy sources need to be replaced lead to the growing frequency and severity of extreme weather. As such, the negative impacts of climate change are considered to be quite extensive, affecting our socio-economic activities as well as the natural environment surrounding us, resulting in great loss.

Possible scenario of climate change risks

What if countermeasures are not undertaken?

- Global GHG emissions will increase by approximately 13% in 2030 and more than 30% in 2050 (compared to 2020 levels).
- In the worst-case scenario, the extent of global temperature rise at the end of this century may reach 4.4°C.
- Currently, living conditions of approximately 3.3 to 3.6 billion people around the world are extremely vulnerable to the impacts of climate change.
- Climate change-related damage to society could further increase with the escalation of global warming.

Source: Compiled by Resona Asset Management in reference to the IPCC's Working Group III report as part of its Sixth Assessment Report and materials published by the Working Group II.

with renewable sources to expand the use of clean energy. In addition, considering that a large variety of goods used in society are made using fossil fuels, we need to promote the use of recycled materials. To address these challenges, the Fund is well aware of intertwined relationship between demand and supply, such as the relationship between energy suppliers and consumers and, accordingly, has classified solutions to the climate change-related issues into eight categories. Our Theory of Change thus informs our approach to the resolution of these issues based on the assessment of each solution category in light of its importance, timeframe and interaction among them. Backed by this Theory, the Fund intends to invest in differentiated businesses (e.g., technologies, products, services and business models) aimed at making a positive impact in terms of contribution to both the mitigation of and adaptation to climate change.

*A comprehensive description or diagram explaining why and how positive change can be made vis-à-vis social issues calling for resolution through a certain initiative.



> Eight primary solution fields of focus (Impact Target) and relevant investee corporations





Issues We Aim to Address — Countering the Climate Change Problem and Creating a Sustainable World

The seriousness of climate change —The current status of relevant issues examined from a global perspective

In 2021, the Intergovernmental Panel on Climate Change (IPCC) issued the Working Group I report, which suggests the evidence of human-induced climate change based on natural science, as part of the IPCC Sixth Assessment Report. The Working Group I report concluded that there is no doubt about the impact of human activity on global warming.

According to this report, the breadth of human-induced rise in global average temperature during the period from the pre-industrial revolution era (1850–1900) to the most recent decade (2010–2019) is considered to span 1.07°C. The report also suggested that it is highly likely that the average temperature has risen at the fastest pace over the 50 years since 1970 than any other period.

Changes in global temperature (average for every decade) from the 1850–1900 period



Source: Summary for policymakers (SPM) regarding the Working Group I report of the IPCC Sixth Assessment Report, provisionally translated by the Ministry of Education, Culture, Sports, Science and Technology as well as the Japan Meteorological Agency ^(note 1)

Note: Gray lines show changes in global average temperature (1–2000 A.D.) based on historical weather records, including those recovered from ancient documents. Black lines show changes in global average temperature (1850–2020 A.D.) based on observational data. The area colored in light gray indicates the scope of a period in which recovered weather records are considered most likely to be accurate. The scope covered by the vertical rectangle on the left indicates estimated temperatures for a past period of several centuries approximately 6,500 years ago, with global temperature considered most likely to be the highest in at least 100,000 years during this period.

To what extent would our lives be affected by a rise in temperature of approximately 1°C? According to the IPCC, the frequency of extremely high atmospheric temperature is currently 4.8 times higher than in the pre-Industrial Revolution period, during which similar phenomenon was observed only once in 50 years. This is deemed to be directly caused by the 1°C temperature rise we are now observing.

Frequency of extremely high atmospheric temperatures in terrestrial regions

Estimated frequency of extremely high atmospheric temperatures compared to the frequency of similar phenomenon observed in the 1850–1900 period (number of instances/50 years)—Five separate scenarios based on the breadth of global temperature rise



Estimated frequency of extremely high atmospheric temperatures based on five separate scenarios regarding the breadth of global temperature rise from the benchmarking period

Source: The Working Group I report of the IPCC Sixth Assessment Report (summarized version published for policymakers)

Scenarios issued by the IPCC include SSP3-7.0, in which no additional countermeasures are implemented, as well as SSP5-8.5, in which the use of fossil fuels is unmitigated and leads to the excessive volume of GHG emissions. In both scenarios, the rise in average temperature from the pre-industrial revolution era is expected to span 3.6℃ to 4.4℃ by 2100. As explained earlier, the frequency of extremely high atmospheric temperatures, which had been a rare phenomenon observed only once in 50 years, would increase 39.2 times should the global temperature rise reach the above levels. In fact, when heat waves struck many parts of Europe and North America in 2021, atmospheric temperatures observed in some regions amounted to nearly 50°C. In Japan, meanwhile, an exceptionally high temperature akin of that in a peak summer day was recorded in June 2022. In particular, atmospheric temperatures observed in certain regions in Gunma Prefecture surpassed 40℃ for the first time in recorded history. There is a serious concern about a further increase in the frequency of this abnormal weather.



Source: The Working Group I report of the IPCC Sixth Assessment Report (summarized version published for policymakers)

Striving toward a sustainable world

To avoid serious risks arising from climate change, it is essential to rapidly reduce the volume of GHG emissions worldwide in line with the Paris Agreement aimed at curbing the global temperature rise within 1.5°C. The mitigation of climate change thus requires reversing the ever-increasing trend of GHG emissions volumes around the globe and achieving net zero emissions by 2050. To this end, systematic transformation is essential. We believe that funds from investors across the world should be directed toward this transformation. The IPCC also reports that a 1.5°C rise in global temperature cannot

be avoided even if best possible countermeasures are introduced. Furthermore, it is anticipated that, in the worst-case scenario, the breadth of global temperature rise at the end of this century may reach 4.4°C. Taking these projections into account, we deem it important to work on adaptation to climate change even as we strive for its mitigation, with the aim of reducing climate change-induced risks affecting socio-economic activities and natural ecosystems. In this light, the Fund has identified eight priority solution fields relevant to mitigation and adaptation measures. We are currently focused on pursuing investment in these eight fields.



Source: Compiled by Resona Asset Management in reference to the outline of the Glasgow Climate Pact agreed upon at COP26 in November 2021



Mitigation—Strengthening Renewable Energy Source Supply Capabilities



What is needed

Further expansion of renewable energy power generation capacities Enhancement of renewable energy power generation efficiency Resolution of bottlenecks hampering the widespread use of renewable energy

Importance of clean energy supply

Electrification to help reduce fossil fuel consumption

The Working Group III report issued by the Intergovernmental Panel on Climate Change (IPCC) as part of its Sixth Assessment Report suggests that the net volume of GHG emissions around the world amounted to approximately 59 billion tons in 2019. Of this, approximately 13.6 billion tons, or around 23% of total emissions, is from sources associated with electricity and heat energy supply. Thus, this report urges international society to drastically reduce GHG emissions from these sources.

On the other hand, the European Parliament has passed a bill that will come into effect in 2035 that requires all newly manufactured vehicles to be EVs or emit no GHGs. As such, electrification is becoming the subject of growing public expectations to curb GHG emissions.

The increasing importance of the energy sector in the mitigation of climate change

The Fund is paying close attention to relationship between energy suppliers and consumers. Even if electrification progresses, the fundamental cause of the problem will not be resolved as long as a large volume of fossil fuels is being used to produce electricity and no measures are being taken to reduce GHG emissions from power generation.

As explained previously, GHG emissions from sources associated with electricity and heat energy supply (mainly in the energy sector) currently account for around 23% of total emissions. However, once major progress is achieved in the shift to electrification among energy consumers, the proportional volume of emissions from such sources will grow even larger should the current composition of energy sources remain unchanged.

Based on this projection, we consider reducing indirect GHG emissions from the energy sector to be a matter of growing importance in light of the future realization of net-zero emissions.

Costs associated with renewable energy power generation are expected to decline considerably, with significant potential to curb GHG emissions

The IPCC report mentioned previously assumes that wind power generation and solar power generation have the potential to help reduce approximately 8 billion tons of GHG emissions by 2030. Furthermore, costs of these power generation methods per unit of output have declined significantly as they have gained increasing popularity over past two decades. While these energy sources currently account only for supplementary proportions in the overall output volume, an increasing number of facilities now operate with lower costs than those associated with conventional thermal power generation. Accordingly, we see the growing likelihood of a further decline in costs associated with renewable energy as these facilities become more widespread.

Taking these factors into account, the Fund pays close attention to corporations equipped with solutions capable of increasing the output volume and efficiency of renewable energy power generation, or those capable of resolving bottlenecks hampering the further popularization of renewable energy.



Change in costs associated with and the output volume of solar and wind power generation

Source: Summary for Policymakers (SPM) issued by the Ministry of Economy, Trade and Industry regarding IPCC/AR6/WG3 Report ^(note 2)

Making wind power generation more powerful and efficient

Power generation facilities supplied by **General Electric (GE)** currently account for one third of the global total of power generation outputs. In the wind power turbine market, the company



similarly commands a large share. Building on its superior technological capabilities, GE provides the market with power turbines boasting world-leading power generation capacity and efficiency and, therefore, is expected to help reduce power generation costs. Furthermore, the development of facilities capable of generating a greater output per turbine will help enable power companies to reduce the number of turbines installed and thus reduce the burdens of facility operation and maintenance.

Popularization of distributed energy resources (DER)

There is an emerging concept that aims to facilitate local consumption of energy procured from local sources through the distributed placement of small-scale renewable energy



sources. This concept is called distributed energy resources (DER) and is expected to enable the more effective utilization of renewable energy sources that inherently involve radical fluctuations in power generation outputs.

To generate the same output, both solar and wind power generation facilities require considerably larger premises than thermal power plants, with per-unit-of-output land space for the former two facilities being several hundred times and several thousand times, respectively, larger than that for the latter. Because of this, the effective utilization of rooftops and other vacant spaces is considered to be extremely important.

Having developed microinverters capable of significantly raising the efficiency of solar panels, **Enphase Energy** provides solutions combining these inverters with IoT and storage batteries. These endeavors increase the possibility of solar panels being installed even in locations that had been previously considered inefficient due to snowfall and other detrimental conditions.

Microinverters contribute to the popularization of solar power generation



Converting surplus energy output to hydrogen

It is anticipated that an increase in the proportion of renewable energy in the overall composition of energy sources will lead to another issue: how to utilize surplus energy output. Possible



solutions include the conversion of surplus energy into hydrogen, which is green energy. This will make it possible to fully utilize surplus outputs without losses.

ITM Power is a manufacturer of water electrolysis cells, equipment for generating hydrogen through the electrolysis of water. With Dr. Graham Cooley, the former CEO of ITM Power, having a background as a storage battery researcher at a major power company, the company has allocated considerable management resources to the development of measures to utilize its electrolysis cells to resolve the surplus energy output issue.

Polymer electrolyte membrane (PEM) water electrolysis cells



Source: ITM Power plc (note 3)

Countering volatility in outputs from renewable energy sources

Although solar and wind power generation are both expected to become mainstream in renewable energy, their performance can be extremely dependent on weather conditions,



making it difficult to gain major popularity. While the volume of energy used by consumers could always fluctuate, suppliers are being called upon to deliver exactly the same amount of energy as what consumers need. Considering the inherent volatility of renewable energy output, suppliers employing it are expected to face difficulties in making such adjustments. As renewable energy sources gain popularity, the possible gap between energy demand and supply needs to be addressed in a more sophisticated way. **STEM** is a software company delivering products related to storage batteries, which provide a solution to the above problem. Athena software developed by this company is designed to connect storage batteries and solar panels while combining these devices with Al-based predictions of energy supply and demand, as well as weather conditions. The software automatically adjusts energy supply volume by controlling battery charging and discharging, the latter of which involves the sale of energy at wholesale or simple consumption by connected devices. Thanks to this product, STEM's customers have seen Internal Rate of Return (IRR) associated with their solar power generation businesses improve by 10% to 30%.

Strengthening Renewable Energy Source Supply Capabilities

Athena, a solution to optimize renewable energy power generation assets



ource: Compiled by Resona Asset Management based on information posted on STEM's corporate website



Mitigation—Strengthening Renewable Energy Source Supply Capabilities

What our **future** should look like

Development of infrastructure for a clean energy supply without negative consequences to society or the environment

Impact targets and corporate contributors (investees)



Provisional calculations aimed at quantitatively measuring the outcome of investee activities in the last fiscal year (outcome: social impacts attributable to corporate activities)

Company name	Impact business/Output	Outcome	Provisional outcome measurement
GE	Wind turbines /Achieving the output of 11.7GW via new installation	Reduced GHG emissions as a result of the switchover from thermal power to renewable energy power generation	Volume of GHG emissions reduced via the above contribution Approximately 18,080,000 t-CO2e*
Enphase Energy	Microinverters shipped /Resulting in the output of 3,621MW (converted to solar power generation output)	Reductions in GHG emissions via the popularization of solar power generation	Volume of GHG emissions reduced via the above contribution Approximately 7,200,000 t-CO2e*
STEM	Software-controlled storage batteries newly installed/Resulting in the output of 300MW (converted to solar power generation output)	Reductions in GHG emissions via the popularization of renewable energy	Volume of GHG emissions reduced via the above contribution Approximately 310,000 t-CO2e*

* The volume of GHG emissions converted to the mass of carbon dioxide

Impact measurement

To measure impacts of our investees' strengthening of renewable energy source supply capacities, we have defined the following three impact pathways: (1) expanding renewable energy power generation capacity; (2) enhancing renewable energy power generation efficiency; and (3) resolving bottlenecks hampering the popularization of renewable energy. We have thus conducted quantitative and qualitative impact measurement based on these pathways. As part of quantitative measurement, our provisional calculation revealed that the volume of GHG emissions reduced in the last fiscal year via the combined contribution of investees named previously amounted to approximately 25,590,000 t-CO₂e.

Volume of GHG emissions reduced via the combined contribution of investees

25,590,000 t-CO2e

Quantitative measurement

GE is a top-tier company in the manufacture of turbines for use in wind power generation. In fiscal 2021, this company shipped turbines with combined output of 11.7GW. With this estimated output, our provisional calculation has determined that the volume of GHG emissions reduced by GE's contribution amounted to approximately 18,080,000 t-CO2e based on the assumption that its turbines replaced high-efficiency thermal power generation turbines. Meanwhile, in the same fiscal year, Enphase Energy, a supplier of microinverters capable of enhancing solar power generation efficiency, shipped microinverter systems the installation of which have the output capacity of 3,621MW. These systems consist of the combination of microinverters, solar panels and storage batteries, with their combined annual output amounting to 13,900GWh. Based on the assumption that these systems were installed to replace thermal power generation facilities, we have then determined, through provisional calculations, that

Qualitative measurement

Enphase Energy not only manufactures microinverters but also boasts strengths in solutions supporting the software-based centralized management of solar panels and storage batteries.

Although the company had been focused on developing operations in North America in its early years, it recently became active in delivering products to Europe, Australia and elsewhere. In Asia, this investee has been paying attention to the Japanese market and is looking to launch its full-scale entry in 2023.

Moreover, Enphase Energy is beginning to accelerate its initiatives to expand into a grid service business. Specifically, this service is expected to support the significant updating of the conventional grid systems, under which power generation equipment in place at single household has functioned only on a standalone basis, and will thus enable multiple household power generation systems to collectively function as a virtual power plant (VPP) via the power of software.

Once these VPPs are connected with grid networks owned by power companies, overall supply adjustment capabilities afforded by such networks will be enhanced. Although a future increase in the compositional proportion of renewable energy sources is likely to lead to growing demand for solutions aimed at curbing fluctuations in energy supply, Enphase Energy's grid service is expected to serve as one such solution. Accordingly, the Fund anticipates that this investee could make a greater impact in the future. the volume of GHG emissions reduced via their contribution amounted to approximately 7,200,000 t-CO₂e.

STEM is a provider of software designed to secure seamless coordination between renewable energy sources and storage batteries to help enhance the profitability and stability of renewable energy power generation. In fiscal 2021, some storage battery makers released new bundle packages combining STEM's software with energy storage whose capacities amount to approximately 300MW (some of these packages involve made-to-order production). Based on the estimated output of energy supply systems supported by its software, we have provisionally calculated the outcome of STEM's activities by employing the same method as that used in outcome measurement for Enphase Energy. As a result, we have determined that the volume of GHG emissions reduced via STEM's contribution amounted to approximately 310,000 t-CO₂e.



Source: Compiled by Resona Asset Management in reference to investor presentation materials published by Enphase Energy



Mitigation—Decarbonizing Existing Power Generation Businesses



What is needed

Realization of net-zero GHG emissions from existing thermal power generation facilities through, for example, carbon capture and hydrogen utilization

Enabling these facilities to function as multipliers supporting the spread of renewable energy

Issues confronting fossil fuel-powered thermal power generation and possible countermeasures

Estimated volume of future GHG emissions from thermal power generation

It has been projected that net-zero GHG emissions could never be achieved if fossil fuel-based infrastructure (all facilities and equipment using fossil fuels, including vehicles) currently in place remains operational until the expiration of its service life. This projection shows that the accumulated volume of GHG emissions from said infrastructure would surpass the threshold of a 1.5° rise in global temperature by the end of this century.

Accumulated volume of CO₂ emissions from fossil fuel-based infrastructure

Emissions volumes to be accumulated since 2018 until the expiration of infrastructure's service life (Billion t-CO ₂)		
Volume of emissions from existing fossil fuel-based infrastructure	658	
Emissions from energy-related infrastructure (mainly thermal power generation)	358	
Reference: Estimated volume of emissions from fossil fuel-based infrastructure, construction of which is currently planned	188	
Reference: Volume of acceptable emissions in line with the 1.5° C (50% to 66%) pathway (Billion t-CO ₂)	420 to 580	

Source: Tong et al. (note 4), Rogelj et al. (note 5)

It is estimated that emissions from energy-related infrastructure, which mainly consists of thermal power generation facilities, account for more than half (around 358.0 billion tons) of overall emissions from existing infrastructure (note 4).

There are a few reasons why emissions from energy-related infrastructure account for a major proportion, starting with the fact that the prolonged service life of this infrastructure is considered to contribute to the accumulation of emissions volume. In addition, its ongoing importance as a foundational component supporting society makes it hard to reduce that proportion. Because of this, the development of decarbonization technologies to be applied to existing power generation facilities will be of extreme importance. These technologies include retrofitting parts to enhance power generation efficiency, implementing carbon capture, and replacing fossil fuels with green hydrogen.

Thermal power generation as a multiplier supporting the popularization of renewable energy

The transition to renewable energy power generation is essential to reduce society's dependence on fossil fuel-based power generation.

However, this transition requires the resolution of issues arising from the inherent volatility of renewable energy output.

Currently, the switchover from coal to gas is expected to immediately support the early reduction of GHG emissions.

According to GE, this switchover is expected to curb carbon emissions by 50% to 60%. On the other hand, replacing coal-fired thermal power generation with renewable energy (solar and wind power generation) with the same amount of output would only result in reducing GHG emissions from the entire power generation system by 25% to 45%. This is because of supplemental coal-fired thermal power generation will be required whenever output from renewable energy power generation fails to fully meet energy demand. However, the overall volume of GHG emissions could be reduced by 62% to 78% if coal-fired power generation is replaced with a combination of renewable energy and natural gas power generation. When the above combination is further augmented by storage batteries, the volume of GHG emissions is expected to decrease by around 68% to 80% ^(note 6).

In addition, the switchover of fuel for thermal power generation to green hydrogen, biomass or other low-carbon fuels is expected to further reduce GHG emissions.

Scenario-based analysis of the volume of emissions to be reduced by the switchover from coal-fired thermal power generation

Alternative energy sources to be introduced	Volume of CO2 emissions to be reduced per day	
Solar and wind power	25% to 45%	Although the emissions volume can be reduced to zero during 25% to 45% of the day, supplemental coal-fired thermal power generation becomes necessary when solar and wind power outputs are insufficient (based on the average facility utilization ratio)
Natural gas	50% to 60%	The volume of emissions can be reduced by 50% to 60% throughout the day. Thanks to stable outputs from natural gas power generation, coal-fired thermal power generation is no longer necessary.
Solar and wind power Natural gas	62% to 78%	The volume of emissions can be reduced to zero during 25% to 45% of the day. For the remaining hours of the day, however, this combination results only in reductions of 50% to 60% due to the operation of natural gas thermal power generation.
Solar and wind power Natural gas Storage batteries	68% to 80%	Through the incorporation of storage batteries, the capacity of which is determined by economic efficiency, the volume of emissions can be reduced to zero during 35% to 50% of the day. Natural gas thermal power generation will be used for the remaining hours of the day, resulting in reductions of 50% to 60% in emissions volume.

Source: Compiled by Resona Asset Management based on reports published by GE

Corporations that make a positive impact in terms of decarbonizing existing power generation businesses

Decarbonizing thermal power generation

We expect **GE** to significantly contribute to the decarbonization of thermal power generation as a power generation facility supplier that has delivered products whose outputs accounts



for one third of the global total of power generation outputs.

To achieve net-zero GHG emissions, the transition to renewable energy power generation is essential. This transition will, however, require extensive reform of the power industry and, therefore, involve some major challenges that must be overcome. For example, power companies will be asked to ensure affordable energy rates through the development of economically efficient supply systems in the face of rapidly growing energy demand due to population growth, the widespread use of EVs and other factors.

In this regard, we expect that natural gas thermal power generation facilities equipped with carbon capture and storage (CCS) technologies to reduce their GHG emissions will most likely support the proportional growth of renewable energy power generation. Specifically, these facilities could be of great help to communities powered mainly by solar and wind power generation, the output of which can fluctuate radically.

GE has established an ambitious goal of achieving net-zero emissions from its thermal power generation business after appointing a new CEO from among external candidates for the first time in its history. As part of its pursuit of this goal, GE has disclosed a roadmap as illustrated below.

GE's roadmap toward the realization of net-zero emissions from thermal power generation



* High-efficiency, air-cooled gas turbines manufactured by GE

- Note: The above graph indicates the estimated degree of reductions, with the global average carbon intensity of coal-fired thermal power generation defined as 100.
- Technologies currently being utilized

Technologies expected to be improved going forward

Source: Compiled by Resona Asset Management based on investor presentation materials published by GE

GE is promoting the in-house development of HA (high-efficiency gas turbines), carbon capture, hydrogen combustion and other element technologies expected to play important roles in the above roadmap. Acting as an industry forerunner, GE is also engaged in the mixed combustion of hydrogen on a commercial basis, with its proportion in total fuel composition being 50%. Furthermore, GE aims for the establishment of energy generation technologies powered solely by hydrogen in 2030. Accordingly, we expect GE to create a great impact.

Green hydrogen

Hydrogen is expected to become a significant contributor to decarbonization by replacing fossil fuels for automobiles and by serving as a raw material for plastics, as well as other applications.



Currently, however, hydrogen production is mostly dependent on a natural gas-powered manufacturing process, which emits CO₂. According to **ITM Power**, the volume of CO₂ emissions from said process is estimated at approximately 800 million tons (note 7). This is equivalent to the volume of nationwide CO₂ emissions from the United Kingdom and Indonesia combined. These circumstances call for the adoption of green hydrogen-that is, hydrogen produced via an emission-free manufacturing process. ITM Power is a manufacturer of equipment capable of producing hydrogen through water electrolysis, a process that generates no CO₂ emissions. We believe that technologies possessed by this company are more advanced than those of its peers, especially in the field of polymer electrolyte membrane (PEM), which is capable of aligning outputs so that hydrogen power can better supplement renewable energy power generation.

Furthermore, the company runs an industry pioneering, large-scale hydrogen production facility. Therefore, we expect it to greatly help reduce hydrogen production costs, a bottleneck currently hampering the widespread adoption of green hydrogen.

A new plant run by ITM Power



ITM Power Bessemer Park | 1GW pa Capacity Electrolyser Factory

Source: ITM Power plc (note 7)



Mitigation—Decarbonizing Existing Power Generation Businesses

What our **future** should look like

Achievement of net-zero emissions from thermal power generation to enable it to support the spread of renewable energy, with an eye to realizing an ideal energy mix along with decarbonizing existing facilities



Provisional calculations aimed at quantitatively measuring the outcome of investee activities in the last fiscal year (outcome: social impacts attributable to corporate activities)

Company name	Impact business/Output	Outcome	Provisional outcome measurement
GE	Upgrading existing power generation infrastructure	Reducing GHG emissions by decarbonizing such infrastructure	Estimated volume of GHG emissions reduced by GE's contribution: Approximately 700,000 t-CO2e*

* The volume of GHG emissions converted to the mass of carbon dioxide

Impact measurement

To measure impacts created by our investees via the decarbonization of existing power generation businesses, we have defined the following three impact pathways: (1) upgrading existing infrastructure; (2) decarbonization via the use of hydrogen and; (3) implementing carbon capture. We have thus conducted quantitative and qualitative impact measurement based on these pathways. As part of the quantitative measurement, our provisional calculations showed that the volume of GHG emissions reduced in the last fiscal year as a result of the previously-mentioned investees' contributions amounted to approximately 700,000 t-CO₂e.

Volume of GHG emissions reduced via the combined contribution of investees

700,000 t-CO2e

Quantitative measurement

A provisional calculation by the Fund revealed that, in the last fiscal year, GE reduced GHG emissions from its existing power generation infrastructure by approximately 700,000 t-CO₂e through facility upgrades.

The above-mentioned upgrading involved the retrofitted installation of Advanced Gas Path, a component designed to enable power generation infrastructure that is already operational to achieve even higher performance at higher temperatures. This method enhances combustion efficiency without the need to construct a new facility. In this way, GE helps reduce GHG emissions volume. Currently, GE is also considered to create positive outcomes by replacing coal-fired thermal power generation facilities with natural gas thermal power generation facilities that use its high-efficiency turbines.

Looking ahead, we also expect GE to disclose detailed numerical data that can be used in the more precise calculation of the outcomes it creates.

Qualitative measurement

ITM Power, a manufacturer of water electrolysis facilities for use in the production of green hydrogen, shipped equipment worth £110 million in the last fiscal year. Our provisional calculation revealed that the volume of GHG emissions reduced by this investee amounted to approximately 20,000 t-CO₂e, based on the assumption that green hydrogen produced by the above-mentioned equipment has been used to replace gray hydrogen, which is manufactured via a process using natural gas. However, we have not included results of this calculation into quantitative impact measurement because green hydrogen produced by said equipment is currently used to decarbonize other industrial processes. Nevertheless, in light of ITM Power's recent efforts to accelerate the manufacture of similar equipment, we anticipate an even greater impact through the establishment of hydrogen combustion technologies employing its green hydrogen as well as GE's facilities and other elements.

In the 2022 edition of its Sustainability Report, **GE** disclosed the volume of its Scope 3 emissions associated with its natural gas thermal power generation segment ahead of its industry peers. The volume of Scope 3 emissions, the disclosure of which has been strongly requested by the Fund, is considered an important indicator for measuring the progress of GE's goal of achieving net-zero emissions from thermal power generation, an ambitious pursuit deserving of our close attention.

Although GE is deemed to be indirectly responsible for about one third of combined GHG emissions from thermal power generation facilities around the world, we consider its decision to disclose the specific volume of GHG emissions from its facilities, along with its reduction targets, to deserve immense recognition and, therefore, we highly appreciate its commitment to tackling climate change.

Volume of emissions from GE products sold

Net volume of CO₂ emissions attributable to the introduction of steam and gas turbines (throughout the course of service life)

2021	477,000,000 tons
Target for 2030	300,000,000 tons to 400,000,000 tons

Note: Scope 3 emissions based on calculation methods defined for Category 11 (Use of Sold Products) under the GHG Protocol, an international standard for reporting GHG emissions volumes

Source: Compiled by Resona Asset Management based on investor presentation materials published by GE



Mitigation—Electrifying Energy Sources

What is needed

Decarbonization of the transportation sector through EVs
 Electrification in building facilities, industrial processes and other fields
 Adoption of low-carbon energy sources along with electrification

Potential of the electrification of energy sources to reduce CO₂ emissions

Reducing CO₂ emissions via electrification

The electrification of energy sources, which is the switchover to a process powered entirely by electricity, is a viable option to reduce CO₂ emissions, a primary component of GHG emissions from the demand side. Thus, electrification is expected to work quite effectively in this area along with such measures as enhancing energy consumption efficiency (e.g., energy-saving measures) and replacing fossil fuels with alternatives such as biofuels.

Given these factors, a scenario issued by the International Energy Agency (IEA) suggests that, for net-zero emissions to be accomplished in 2050, the share of electricity for end-user consumption of all types of energy should reach 50%, calling for its proportional growth from the current level at around 20%.

Estimated growth in the ratio of electrification leading up to the net-zero emissions status and its utilization in each sector

	2020	2030	2050
The share of electricity achieved by energy end users	20%	26%	49 %
Reference: Share of electric furnaces in steelmaking	24%	37%	53%
Reference: Ratio of electrification in light industries	43%	53%	76%
Reference: Ratio of EVs used as general passenger vehicles	26%	54%	100%
Reference: Ratio of heat pump utilization as part of heat energy supply for buildings	7%	20%	55%

Source: Compiled by Resona Asset Management based on materials issued by the IEA $_{\rm (note \ B)}$

The IEA also exemplifies potential methods that need to be implemented to raise the ratio of electrification. These include utilizing electric furnaces to produce steel, updating heat utilization processes for light industries that can implement electrification, employing EV passenger cars, and popularizing heat pumps* for use in hot water supply, etc., at households and office buildings ^(note 8).

* Equipment designed to generate heat by taking advantage of similar mechanisms as those used in air conditioning systems

Promoting the supply of clean energy as well as the electrification of the demand sector

To achieve major reductions in CO₂ emissions via electrification, decarbonizing electricity produced by suppliers is of critical importance. If suppliers fail to robustly incorporate clean energy sources in their efforts to meet ever-increasing energy demand, the volume of CO₂ emissions could grow and thus nullify the intended effect of the electrification measures undertaken by the demand sector. The widespread use of clean energy is key to maximizing electrification's effect in reducing CO₂ emissions. The following diagram suggests that countries with smaller CO₂ emissions volumes associated with energy supply (horizontal axis: CO₂ emissions intensity of energy sources) are better positioned to achieve greater reductions in CO₂ emissions by introducing EVs, one of the most famous examples of electrification technology.

Country-by-country analysis of relationships between the national potential to reduce CO₂ emissions via the use of EVs and the CO₂ emissions intensity attributable to energy supply



Source: Central Research Institute of Electric Power Industry $^{(\mbox{note 9})}$ Note:

BASE: general gasoline/diesel cars;

ADVN: fuel-efficient gasoline/diesel cars; ELEC: electric vehicles

Infrastructure supporting the transition to an EV-based society

Based in Norway, a country known for advanced EV technology, **Zaptec** AS is a leading manufacturer of EV battery charging systems in Europe. In Norway, EVs accounted for around 65% of



new cars sold in 2021. Moreover, the Norwegian government aims to raise the ratio of EVs and other zero-emission new cars to be sold in fiscal 2025 to 100%. Moreover, a similar transition to EVs is now under way in other European countries at a faster pace than expected through, for example, the introduction of stricter regulations on gasoline-powered vehicles and the subsidies for EV purchases.

Zaptec supplies charging facilities employing the alternate current (AC) and boasting low costs, superior efficiency and convenience. Currently, the company commands a 50% share of the Norwegian market while maintaining charging facilities in 75,000 locations across six countries in Europe. The Fund recognizes Zaptec as contributing to a global transition to an EV-based society through the provision of easily-accessible EV charging infrastructure for commercial facilities and households.

An EV charging system produced by Zaptec



Source: Zaptec AS (note 10)

Resolving bottlenecks in EV manufacturing and disposal

Li-Cycle Corp. is a Canada-based tech company that provides a unique solution enabling the recycling of dust containing metals, a byproduct emitted in the course of EV battery manufacturing,



into a battery raw material. The most remarkable feature of this technology is that it uses no heat. Accordingly, Li-Cycle's process boasts superiority over conventional processes based on the pyroprocessing that uses heat from the perspective of minimizing GHG emissions.

The Fund believes that if EVs become mainstream vehicles going forward, the recycling of EV batteries will gain importance due to the expected shortage of cobalt, nickel and other battery raw materials. We have also found another solution offered by the company to be quite promising, which enables the safe and efficient recycling of used batteries. Preventing a loss of materials during battery manufacturing while recycling used batteries from EVs and other devices



Source: Compiled by Resona Asset Management

Promoting electrification in the industrial field

Befesa S.A. is a world-leading company in the recovery and recycling of waste (electric furnace dust) emitted via steelmaking using electric furnaces. The Waelz process, the mainstream method



currently used for the recycling of electric furnace dust, was developed and commercialized by Befesa's precursor company. As such, the company gained robust know-how which, in turn, gives it distinctive strength in this field.

In the steel industry, the switchover of steelmaking furnaces from blast furnaces to electric furnaces is considered a viable method to reduce the volume of GHG emissions. The steelmaking process employing electric furnaces is typically undertaken to produce crude steel and involves the recycling of galvanized steel sheets that are discarded. Unlike blast furnaces, electric furnaces use no fossil fuels as raw materials. Although this process is appealing in terms of its potential to minimize GHG emissions, electric furnace steelmaking cannot be a sustainably profitable operation unless the dust it emits is disposed of efficiently. In this light, the Fund has great expectations for Befesa serving as a catalyst spurring the global popularization of electric furnace steelmaking.

Drastically reducing electricity consumption by the IT industry

QD Laser, Inc. is a company boasting a world-leading technology in the field of quantum dot lasers. The Fund considers the company's technology to have great potential to contribute to major reductions in energy consumption by the IT industry.



As it plays an essential role in social development through the operation of data centers and other facilities, this industry is, in the near future, expected to see exponential growth in the volume of data requiring processing and, therefore, turn into an even greater energy-consuming sector. However, quantum dot laser and other technologies offered by this investee help promote optical networking at data centers and thus provide the most effective solutions for the pressing need to reduce their energy consumption. While electrical signaling is currently used as the mainstream method for data transfer among server components or servers themselves, this method inevitably produces a loss of energy due to heat generation. It is estimated that if this method is replaced by optical interconnections, which involve less heat emission, servers' energy consumption could be reduced by up to 40% through improved energy efficiency and the reduction of server cooling devices (note 11). Moreover, we have concluded that, in terms of its potential to launch mass production, QD Laser has advantages over its competitors. Accordingly, we expect the company to achieve growth going forward.



Mitigation—Electrifying Energy Sources

What our **future** should look like

Promoting major reductions in fossil fuel demand by advocating for the widespread use of electrifying solutions backed by clean energy

Impact targets and corporate contributors (investees) Action Impact Target Actions taken by investee corporations Electrifying energy sources Electrifying kinetic " energy sources EV battery recycling sources, etc. Disposal of waste from electric furnaces **Optical networking** K consumption by QD Laser m enhancing efficiency

Provisional calculations aimed at quantitatively measuring the outcome of investee activities in the last fiscal year (outcome: social impacts attributable to corporate activities)

Company name	Impact business/Output	Outcome	Provisional outcome measurement
Zaptec	EV charging facilities /50,000 chargers installed	Providing charging infrastructure to facilitate a shift to EVs	Qualitative measurement only
Li-Cycle	Recycling/Equivalent to battery raw materials totaling 3,400 tons	Contributing to reductions in GHG emissions mainly by enabling the omission of mining and refining processes	Volume of GHG emissions reduced via the above contribution Approximately 10,000 t-CO2e
Befesa	Recovery and recycling of electric furnace dust/Dust emitted via the production of crude steel totaling 44 million tons	Making contributions to reduce GHG emissions by recycling non-ferrous metals	Volume of GHG emissions reduced via the above contribution Approximately 30,000 t-CO2e
QD Laser	Quantum dot laser business /Net sales of ¥127 million	Helping to enhance the energy efficiency of information communications via optical networking	Qualitative measurement only

Impact measurement

To determine the magnitude of impacts created via the electrification of energy sources, we have defined the following three impact pathways: (1) electrifying kinetic energy sources; (2); electrifying heat sources, etc. and; (3) reducing energy consumption via the enhancement of efficiency. We have thus conducted quantitative and qualitative impact measurement based on these pathways. As part of quantitative measurement, our provisional calculation showed that the volume of GHG emissions reduced in the last fiscal year as a result of the previously-mentioned investees' contributions amounted to approximately 40,000 t-CO₂e.

Volume of GHG emissions reduced via the combined contribution of investees

40,000 t-CO2e

Quantitative measurement

Befesa, which handles the recycling of dust emitted from electric furnaces, recovered and recycled a total of 880,000 tons of furnace dust in fiscal 2021. Usually, the volume of dust emitted from electric furnaces in the course of producing one ton of crude steel amounts to around 20 kilograms (or 2%). Based on this proportion, we have determined, via provisional calculations, that the company has recovered the equivalent volume of dust emitted in the course of producing crude steel totaling 44 million tons. In the same fiscal year, the company also sold a total of around 290,000 tons of zinc oxide made from such dust. Assuming that a portion of GHG emissions from zinc ore mining has been offset by the provision of this recycled zinc oxide, we have determined that the volume of GHG emissions reduced by Befesa's contribution amounted to 30,000 t-CO2e. We also believe that the company's indirect contribution to the transition from blast furnaces to electric furnaces deserves our close attention due to its resulting positive impact on reductions in GHG emissions. If we assume that electric furnaces equipped with Befesa solutions replace blast furnaces previously

Qualitative measurement

Zaptec's corporate vision is to change the world for the better by creating a more sustainable and electric future. To achieve this vision, the company recognizes that simply manufacturing and marketing EV battery charging facilities will be insufficient. The Fund empathizes with the company on this.

Based on a provisional calculation, the Fund determined that the number of charging facilities sold by the company totaled approximately 50,000 in fiscal 2021. Since Zaptec's market share in Europe is rapidly growing, we anticipate that the company's charging facilities could one day function as essential social infrastructure.

If the widespread use of EVs comes into reality in the near future, many people would charge their vehicles after coming home in a manner akin to charging their smartphones. However, should the ownership of EVs among citizens become as commonplace as that of smartphones, our society may be hit by a temporary shortage used in steelmaking, we can conclude that the volume of GHG emissions reduced by its contribution in this area amounted to 66 million tons in fiscal 2021 alone. Thus, Befesa is considered to have contributed to the creation of a major positive impact. Meanwhile, Li-Cycle, which boasts strength in EV battery recycling technologies, produced approximately 2,000 tons of black mass (a battery raw material containing nickel and other metals) via recycling in the same fiscal year. We have analyzed data regarding the volume of GHG emissions that would have emerged in the course of ore mining aimed at obtaining the same amount of similar metal content, as well as carbon footprint of the company's business activities, thereby determining that the volume of GHG emissions reduced by the company's contribution amounted to 10,000 t-CO2e. Although Li-Cycle's operations have gotten on a commercial track only recently, the Fund expects it to achieve major future growth in terms of outcome via, for example, the full-scale launch of a U.S. recycling hub facility currently under construction.

of electricity when a great number of EV users begin charging their vehicles at the same time. This could, in turn, result in a radical imbalance in energy demand and supply, possibly inducing large-scale blackouts. The Fund considers this possibility to be a major bottleneck hampering the popularization of EVs.

Building on capabilities of its own software designed to monitor and manage the status of charging facilities, Zaptec is looking to grow into a provider of solutions to optimize the status of energy supply and EV charging by country and region and, to this end, is engaged in ongoing development efforts. We expect the company to hone this strength to one day become a contributor to a positive impact in the area of energy supply and demand adjustment. In sum, the Fund has great expectations for Zaptec's future

endeavors to play an important and multilateral role in facilitating the popularization of EVs.





Mitigation—GHG Reduction Measures Other Than Electrification and Energy-Saving Initiatives



What is needed

- Reduction of GHG emissions from the energy-demand sectors in areas incompatible with electrification
- Increasing efficiency to reduce energy consumption
- Replacing fossil fuels currently used as raw materials and fuels with alternatives to reduce use



Curbing the use of fossil fuels as raw materials, a problem that cannot be solved by electrification

Measures to reduce fossil fuel use in areas incompatible with electrification

Although electrifying energy sources is considered to be a great part to across-the-board efforts to reduce GHG emissions, there are some areas incompatible with electrification. These areas, however, still need robust measures to curb emissions.

In this regard, we pay attention to solutions for industry, transportation and buildings, all of which are energy-consuming sectors and great GHG emitters.

Volume of direct and indirect GHG emissions by sector (2018)



Source: William F Lamb et al. (note 12)

Areas incompatible with electrification

Currently, around 10% of global GHG emissions arise from the use of heat generated through fossil fuel combustion as part of various industrial processes (note 12). This proportion surpasses the combined volume of emissions from private automobiles and aircrafts.

Heavy industry typically involves the use of heat. For example, plastic manufacturing uses heat to modify the molecular structure of raw materials in a high-temperature environment. Cement production, too, uses heat while also emitting CO₂ through the thermal decomposition of limestone, a cement raw material. Taking these factors into account, the manufacture of 4 billion tons of cement results in emitting 2 billion tons of CO₂ ^(note 12).

More than half of industrial processes using heat require a high temperature of over 200°C (note 13). Although some processes can be done at a temperature of 200°C or lower via the use of next-generation heat pumps powered by electricity, others such as chemical manufacturing, cement production and steelmaking require 300°C to 2,200°C temperatures. Energy sources used in these processes are difficult to replace with electricity. Accordingly, decarbonization efforts in these fields need to incorporate not only the use of electric furnaces but also the mixed combustion of green hydrogen, the manufacturing process of which emits no CO₂, as well as biomass fuels.

The transportation sector, while looking to reduce its emissions through the use of EVs, is considered to remain a fuel consumer because long-distance transportation employing large rolling stock, aircrafts and marine vessels is unlikely to be compatible with electrification. However, replacing fossil fuels used in these areas with green hydrogen and biomass fuels could be a promising solution.

Reducing the use of fossil fuels as raw materials

Electrification is not a viable option to reduce emissions for processes that use fossil fuels as raw materials.

For example, steelmaking uses coal or natural gas to refine iron ore into steel (direct reduction method). Currently, research projects are under way in many countries to establish a technology to replace these fossil fuels with hydrogen. Moreover, it has been found that hydrogen can serve as a raw material for plastic through combination with CO₂.

Thus, the Fund not only supports the transition to a circular economy but also believes that replacing fossil fuel-based raw materials with green hydrogen and other alternatives is important.

Corporations that make a positive impact in terms of promoting GHG reduction measures other than electrification and energy saving initiatives

Reducing the use of fossil fuels in steelmaking

In the steelmaking sector, implementing measures to reduce GHG emissions from blast furnaces is as essential as transitioning to electric furnaces. **SSAB** is a Sweden-based blast furnace maker



boasting strength in manufacturing facilities for special steel. Although its mainstay crude steel production facilities currently employ the conventional, fossil fuel-fired blast furnace method, the company began developing hydrogen direct reduction steelmaking technology ahead of its peers, with the aim of achieving commercial production with this new method. Furthermore, SSAB's business plans include a goal of establishing a production structure completely free of fossil fuels by 2030. Although the steelmaking sector accounts for 7% of global CO₂ emissions ^(note 14), the volume of GHG emissions from it could be reduced considerably if hydrogen direct reduction steelmaking becomes widespread. The Fund expects SSAB to make a greater impact going forward, believing that its hydrogen direct reduction steelmaking project has a potential to serve as a game changer in this industry.

Construction machinery manufactured by VOLVO with fossil-free steel



Source: SSAB AB (note 14)

Replacing fossil fuels with green hydrogen

Replacing fossil fuels with green hydrogen will be key to decarbonization. This especially applies to processes employing heat and kinetic energy as well as those using fossil fuels as raw materials (e.g., steelmaking and chemical manufacturing), with their GHG emissions expected to decline significantly once green hydrogen becomes mainstream.

The language gevernment sime

The Japanese government aims to achieve carbon neutrality in 2050, and the achievement of this goal similarly hinges on the supply of



green hydrogen, the manufacturing process of which emits no ${\rm CO}_2$.

ITM Power is a company boasting superior competitiveness in the production of high-efficiency PEM electrolysers, which are relatively compact compared with other green hydrogen manufacturing facilities. In Japan, the company acts in partnership with Sumitomo Corporation to market these products which are utilized by end users whose businesses involve the manufacture of methane through the combination of hydrogen and CO₂ to provide an alternative fuel and other offerings.

Pursuing energy saving for buildings and reducing their GHG emissions to net zero

Xinyi Glass is a comprehensive glass maker whose extensive lineup includes float glasses and other products used for a range of applications, from construction to automobiles. The Fund expects the company to help reduce GHG emissions as it provides eco-friendly Low-E double-glazed glass that boasts

superior heat insulation and can contribute to energy saving in housing and other fields. Covered with a special metal layer, this glass keeps in around two thirds of heat that would



otherwise escape through regular single-glazed windows. This will, in turn, greatly help raise the efficiency of air conditioning for both heating and cooling.

The company has also positioned its mission as contributing to the environment through manufacturing focused on technological accomplishments and product functions. In particular, its pursuit of manufacturing technologies includes the design and introduction of state-of-the-art facilities. Although the glass industry is known to be a domain for corporations with long histories, Xinyi Glass is relatively young, and thus takes a bolder approach that transcends the scope of existing infrastructure and technologies.

Also, the company has its head office in the Hong Kong Science Park, the largest R&D-focused industrial park in Hong Kong. Drawing on its technology-centered strategies, the company is looking to become a market dominator, especially in Asia. We expect it to continuously create a positive impact through further innovation.

Glass with superior heat insulation to enhance buildings' energy efficiency



Source: Compiled by Resona Asset Management



Mitigation—GHG Reduction Measures Other Than Electrification and Energy-Saving Initiatives

Corporations that make a positive impact in terms of promoting GHG reduction measures other than electrification and energy saving initiatives

Replacing fossil fuels with renewable fuels

Replacing fossil fuels with alternative energy sources is expected to reduce GHG emissions from the transportation and industry sectors.

Novozymes is a global biotechnology company that commercializes biologically derived products (e.g., enzymes and microorganisms) and commands major market shares in various fields. The Fund



has found the company to be capable of creating positive impacts in multiple fields. We also pay close attention to its current contributions to stable biofuel manufacturing through the provision of enzymes and other offerings. For example, new enzymes produced by Novozymes are now gaining popularity as they have made it possible to utilize cellulose, a hard fiber, to produce biofuels. The company provides bioethanol manufacturers with these enzymes in addition to engaging in joint initiatives to commercialize next-generation ethanol. In particular, a bioethanol made of cellulose from discarded parts of sugarcane, is expected to greatly reduce the volume GHG emissions by 90% or more if it were to replace gasoline. The Fund expects the company to create a growing impact over the medium term, contributing to potential technological innovation described above.

Darling Ingredients is anticipated to become the world's largest biofuel producer in 2023. We expect the company to provide solutions for decarbonization via the switchover from fossil



fuels to biofuels in areas incompatible with electrification, including large rolling stock, aircrafts and marine vessels.

According to materials published by Darling Ingredients, lifecycle GHG emissions (e.g., emissions from raw materials, production process, distribution and use) of renewable diesel fuels, which are currently its mainstay products, are around 85% lower than that of conventional diesel fuels ^(note 15).

The company's distinctive features include a vertically integrated business model. Although it has been focused on the biofuel business since 2010, the company has originally started out with recycling substances of biological origin. Darling Ingredients is the largest company in this field, boasting a global business track record spanning more than a century in recovering byproducts from livestock rearing as well as waste oil from restaurants, and in recycling them into high-added-value products.

Drawing on the aforementioned business model, the company provides restaurant chains with extremely efficient waste oil recovery equipment. This, in turn, helps them resolve issues related to compliance with environmental regulations while assisting them in their efforts to curb overall GHG emissions in their supply chains through the use of biofuels made of waste oils. In these ways, the company contributes to the enhancement of the brand value of its clients. Renewable diesel fuels sold by the investee help reduce overall GHG emissions



Source: Compiled by Resona Asset Management

Euglena Co., Ltd. is the first company in the world to successfully mass-produce a nutrient-rich alga, which bears the same name as the company. The Euglena microalga is equipped with both



animal and vegetal characteristics and, therefore, is considered to be quite exceptional in biology. Euglena is expected to have a variety of applications in Food, Fiber, Feed, Fertilizer and Fuel, which are collectively referred to as 5F. We have particularly strong expectations for its potential as a biofuel raw material. Because Euglena grows through photonic synthesis, which requires only water and CO₂, it can be cultivated easily and thus provide an energy source through a process with low environmental burden. Currently, biofuels are mostly made of waste oils and byproducts from meat processing, and the supply of these raw materials is expected to face restrictions in the future. Given this projection, a testing plant run by the company to produce Euglena-based biofuels is currently operational, with manufacturing technologies for such fuels being already established. We believe that the company will achieve further technological innovation that will, in turn, open the door for the widespread use of Euglena as a biofuel raw material and, accordingly, we have high expectations for the potential of this investee.



Circular economy/Reducing emissions via behavioral change

Among materials made of fossil fuels, plastics are particularly relevant to our daily lives. Currently, diverse technologies are being developed in countries around the globe to appropriately recycle many types of plastics used in various corners of society. If the transition to a circular economy is accelerated by the establishment of recycling technologies as well as by public recycling behavioral changes, the volume of GHG emissions is expected to decrease even in areas that have been deemed hard to achieve major reductions.

Ball Corporation is a top-tier global company in aluminum can manufacturing. Although the manufacture (refining) of aluminum requires electricity, the incorporation of recycled materials



into aluminum can raw materials is known to curb the energy consumption of the process by 95% ^(note 16). Currently, however, the recycling ratio of aluminum cans varies widely by country, with some countries, including Germany, achieving nearly 100%, but others with great aluminum can consumption volumes like the United States lagging far behind at around 50% ^(note 16). This suggests that there is a large room for reducing energy consumption in this field.

Ball has set an ambitious target of raising the global recycling ratio of aluminum cans and relevant products to 90% by 2030. The Fund expects the company to achieve this target by acting as an industry leader in the development of supply chains and the provision of assistance to governments in lawmaking regarding the deposit return systems (DRS).

Eastman Chemical is a manufacturer of special chemicals and is equipped with a diverse lineup of products for automobiles, textiles and other applications. The company boasts strength in



the synthesis of high-value-added materials through the combination of low-cost raw materials.

Co-polyester is a representative chemical compound invented by the company. Although this plastic is made of PET resin, which is most commonly known as a PET bottle raw material, co-polyester is superior to PET bottles in transparency, durability and pollution resistance in addition to being hard to be scattered when crushed. Based on these features, co-polyester is currently used in portable drink bottles and cosmetics containers. Moreover, the company is striving to create new value to be added to co-polyester by replacing PET resin with recycled raw materials.



Building on its technologies accumulated over many years, Eastman Chemical also boasts a plastic recycling technology called molecular recycling and excellent products made employing it.

Unlike metal recycling, the recycling of plastics involves challenges arising from material degradation. However, the molecular recycling technology is capable of restoring the quality of the original material at a molecular level. Accordingly, recycled raw materials procured using this technology can be used to manufacture products of exactly the same quality as those made of fresh raw materials.

The company's plans now call for launching its first large-scale recycling facility in 2023. The Fund expects this facility to become the first instance in the world to succeed in plastic recycling of a major commercial scale.

Agilyx is a company akin of a "dream team" of highly acknowledged specialists in plastics and recycling as its management. The uniqueness of this company lies in its mode of



operation that constructs a recycling plant in the vicinity of client manufacturing facilities that use plastics as raw materials. The company collects waste plastics, decomposes them at the molecular level and recycles them into high quality plastic raw materials that meet client needs.

Currently, the global recycling ratio of plastics remains at just 10%, with more than 80% being disposed of. Given this, the company has set its mission to raise this ratio to 90% and, to this end, is striving to expand its operations.

Mercari, Inc. aims to contribute to realizing a "society where finite resources are used sparingly and everyone can create new value" through its business.



Until recently, socio-economic growth supported by mass-production and mass-consumption has been seen as positive. However, it has become evident that this will disrupt social sustainability. Against this backdrop, the company strives to expand secondary markets while being particularly focused on fostering changes in social awareness among consumers to realize a recycling-oriented society. For example, it discloses the Mercari Price & Volume Index to assess the magnitude of impacts arising from secondary markets to overall economy, thereby enhancing its social presence. The company also promotes its involvement in education and the development of recycling frameworks in collaboration with administrative agencies and other players. We believe these initiatives will make a positive impact, contributing to the positive consumer perception of using second-hand goods over the long term as well as better public awareness of social and environmental sustainability.



Mitigation—GHG Reduction Measures Other Than Electrification and Energy-Saving Initiatives



What our **future** should look like

Promotion of thorough energy-saving efforts as well as transitioning to a recycling-oriented society and an innovation-driven switchover to non-fossil fuels



Provisional calculations aimed at quantitatively measuring the outcome of investee activities in the last fiscal year (outcome: social impacts attributable to corporate activities)

Company name	Impact business/Output	Outcome	Provisional outcome measurement
ITM Power	PEM electrolyser business /Electrolysers with the output of 11MW delivered	Reduced GHG emissions through the production of clean hydrogen using water and electricity	Volume of GHG emissions reduced via the above contribution Approximately 20,000 t-CO2e
Novozymes	Enzymes for use in biofuel production	Reductions in GHG emissions by switching from fossil fuels	Qualitative measurement only
Darling Ingredients	Renewable diesel fuels /370 million gallons shipped	Reductions in GHG emissions by switching from regular diesel fuels	Volume of GHG emissions reduced via the above contribution Approximately 3,200,000 t-CO2e
Euglena	Biofuels/125KL produced	Reductions in GHG emissions by switching from regular diesel and jet fuels	Volume of GHG emissions reduced via the above contribution Approximately 280 t-CO2e
SSAB	Hydrogen direct reduction steelmaking	Reduced GHG emissions by switching from fossil fuels to hydrogen for the production of crude steel	Qualitative measurement only
Agilyx	Molecular recycling of plastics	Reduced GHG emissions via raw material recycling instead of depending on a fresh supply of fossil fuel-based raw materials	Qualitative measurement only
Eastman Chemical	Molecular recycling business /Three plants (under construction or in planning process)	Potential to reduce GHG emissions by recycling raw materials instead of depending on a fresh supply of fossil fuel-based raw materials	Qualitative measurement only
Ball	Manufacture of aluminum cans, etc. /112.5 billion units shipped	Reductions in GHG emissions via the use of recycled aluminum	Qualitative measurement only
Mercari	Clothing transactions through Mercari/51,000 tons of clothing sold or purchased	Reductions in manufacturing-related environmental burden via the secondary use of consumer goods	Volume of GHG emissions reduced via the above contribution Approximately 480,000 t-CO2e
Xinyi Glass	Production of low-E glass /A total 547,000 km² of glasses used as finished products	Reduced GHG emissions via the popularization of low-E glass equipped with superior heat insulation for buildings	Volume of GHG emissions reduced via the above contribution Approximately 1,980,000 t-CO2e





Impact measurement

To measure impacts created via GHG reduction measures (besides electrification) and energy saving initiatives, we have defined the following three impact pathways: (1) promoting a switchover to non-fossil fuels to supply heat and kinetic energy; (2) transitioning away from fossil fuels as raw materials and; (3) pursuing energy saving. We have thus conducted quantitative and qualitative impact measurement based on these pathways. As part of the quantitative measurement, our provisional calculations showed that the volume of GHG emissions reduced in the last fiscal year as a result of the previously-mentioned investees' contributions amounted to approximately 5,680,000 t-CO₂e.

Volume of GHG emissions reduced through the investees' contributions

5,680,000 t-CO2e

Quantitative measurement

First, with regard to ITM Power, our calculation has determined that the volume of GHG emissions reduced via its contribution amounted to approximately 20,000 t-CO₂e based on the assumption that hydrogen produced by PEM electrolysers shipped by this investee in the last fiscal year, for a total power generation output of 11MW, replaced gray hydrogen, the production process of which uses natural gas and emits CO₂. If our calculation includes electrolysis cells to be shipped going forward based on orders currently received, ITM Power's equipment will be used to produce hydrogen for a total power generation output of around 755MW. In the latter calculation, the volume of GHG emissions to be reduced via the investee's contribution is expected to total approximately 1,500,000 t-CO₂e. As for Darling Ingredients, our calculation has determined that the volume of GHG emissions reduced via its contribution amounted to approximately 3,200,000 t-CO2e based on the assumption that a total of 370,000,000 gallons of biofuels shipped by this investee in the last fiscal year replaced regular diesel fuels.

Regarding **Eastman Chemical**, we have concluded that its molecular recycling technology has yet to yield outcomes, as the company's plastic processing facilities employing this technology are still under construction or otherwise under preparation. However, the company's plans currently call for launching its first large-scale facility in Tennessee, United States by the end of 2023. Once this facility is on line, the volume of GHG emissions to be reduced via the company's contribution is expected to amount to approximately 120,000 t-CO₂e, in light of the facility's annual capacity totaling around 100,000 tons.

Agilyx is similarly in the process of business development under a joint project with its clients. Accordingly, we intend to calculate the outcome of its activities in fiscal 2023 or later.

For **Euglena**, our calculation has determined that the volume of GHG emissions reduced via its contribution amounted to approximately 280 t-CO₂e. This is based on data acquired by the Fund regarding the company's testing plant, the biofuel production capacity of which totals 125 kiloliters per year. In addition, the company is planning to raise this capacity to 250,000 kiloliters in 2025, aiming to achieve a two thousand-fold increase from the current level. If this enhanced capacity is included in our calculation, the volume of GHG emissions to be reduced via the investee's contribution is expected to total approximately 560,000 t-CO₂e.

We anticipate that **SSAB** will launch the large-scale commercialization of hydrogen direct reduction steelmaking in 2026 or later. Once this endeavor succeeds, the company will make a major impact in terms of curbing GHG emissions.

With regard to Mercari, our provisional calculation showed that the volume of GHG emissions reduced via the secondary use of clothing sold or purchased on its platform in the last fiscal year amounted to approximately 480,000 t-CO2e (note 17), taking into account the total weight of such clothing (51,000 tons). The fund has defined results of the above calculation as a quantitative impact created by the investee in terms of reductions in GHG emissions. As for Xinyi Glass, we measured the outcomes it has created in its float glass business and construction glass business. Our calculation has thus determined that the volume of GHG emissions reduced via the investee's contribution in the last fiscal year amounted to approximately 1,980,000 t-CO2e. This calculation is based on the annual energy saving performance of the investee's products, which was determined by taking into account the total square kilometer area they cover, in comparison with that of conventional glasses.



Qualitative measurement

With an eye to 2030, **Ball** aims to radically transform conventional systems in place in the aluminum can manufacturing industry by taking full advantage of its position as a leading company commanding a top share.

The company's sustainability targets for 2030 include raising the ratio of recycled aluminum used in its aluminum can manufacturing process to 85%. This ratio was 61% in 2020. Moreover, the company is currently advocating for all of its industry peers to take a unified stance toward recycling. This initiative also targets supply chain constituents. In this way, the company aims to raise the global recycling ratio, which was 69% in 2020, to 90%.

While the conventional aluminum refining process uses a large volume of electricity, recycling-based aluminum manufacturing enables major reductions in energy consumption, by around 95%. Moreover, unlike plastic, aluminum quality does not degrade even after undergoing conventional recycling processes.

If the company succeeds in raising the ratio of recycled aluminum used in its aluminum can manufacturing process to 85%, the volume of its Scope 3 emissions (GHG emissions from the entire supply chain) is expected to decrease by around 25%. Our provisional calculation showed that the volume of GHG emissions to be reduced by this accomplishment will amount to approximately 3,000,000 t-CO₂e per year.

Furthermore, the volume of GHG emissions from the aluminum can industry as a whole will be significantly reduced by around 10,000,000 t-CO₂e if the aluminum recycling ratio reaches 90% and the ratio of recycled aluminum used in the manufacture of new products reaches 85%, respectively.

Meanwhile, discussions are now underway about the implementation of deposit return systems (DRS). DRS is considered an essential government policy to facilitate aluminum recycling, especially in regions where recycling initiatives have yet to be widespread. These discussions are backed by growing public scrutiny into beverage makers' responsibility regarding significant economic and environmental losses attributable to the simple disposing of aluminum cans. In step with progress in DRS introduction, aluminum recycling operators will be called upon to secure sufficient processing capacities through capital expenditure to accommodate a growing volume of used aluminum.

In this regard, the Fund highly approves of the company as it is actively advocating for recycling by targeting both industry peers, including supply chain constituents, and government bodies, encouraging the former to robustly commit to recycling while providing the latter with policy proposals. Accordingly, we have great expectations for a positive impact to be created by the company upon the accomplishment of its ambitious targets.



Aluminum can recycling ratio in countries around the world (2019)

Source: Compiled by Resona Asset Management based on data disclosed by the Japan Aluminum Can Recycling Association



Mitigation—Carbon Reduction and Capturing Measures in Agriculture, Forestry and Other Fields



What is needed

- Reduction of dinitrogen monoxide and methane emissions in agriculture, livestock farming and other fields
- Increase of the volume of CO₂ captured (fixed) through the revitalization of the forestry sector
- Development and utilization of carbon capture technologies

Decarbonizing agriculture, forestry and other fields involving land use

Volume of GHG emissions in agriculture, forestry and other fields involving land use

Of the overall volume of GHG emissions attributable to human activities, emissions from agriculture (including livestock farming), forestry and other undertakings involving land use account for more than 20%. This is due in part to a growing volume of emissions resulting from deforestation and desertification. While the volume of CO₂ emissions, a major GHG component, from the above undertaking accounts for 13% of overall CO₂ emissions, they are also responsible for 45% and 82%, respectively, of methane (CH₄) and dinitrogen monoxide (N₂O) emissions and thus account for major proportions in emissions of other key GHG components.

Composition of GHG emissions from human activities (average of the 2007–2016 period)



Source: Compiled by Resona Asset Management based on the IPCC Special Report on Climate Change and Land

Increase in the volume of GHG emissions attributable to agriculture (including livestock farming)

The volume of GHG emissions from agricultural activities is on a growth track in step with the ever-increasing global population. The use of nitrogen-based chemical fertilizers is one of the major factors behind this growth.

Nitrogen fertilizers are primarily made of ammonium sulfate, which, over time, changes into dinitrogen monoxide, a GHG. In cereal cultivation, the volume of fertilizers absorbed by crops is considered to account for only around half of the overall volume of what is used on farmland ^(note 19). This suggests that a major portion of fertilizers is being unutilized and eventually changing into dinitrogen monoxide, the greenhouse effect of which is around 300 times stronger that of CO₂. Accordingly, there is an urgent need for countermeasures against its emissions.

Also, the chemical synthesis of ammonia, a manufacturing process essential to obtaining raw materials for nitrogen fertilizers, emits GHGs. This issue similarly calls for countermeasures. The volume of GHG emissions from ammonia manufacturing currently accounts for approximately 1.8% of overall emissions in the field of crop cultivation, with around 80% of manufactured ammonia being used in fertilizer production ^(note 19).

In the field of livestock farming, methane released by cows' burps, etc., is a significant and direct contributor to GHG emissions. Moreover, this field requires the production of a large volume of feed crops for livestock, emitting GHGs from this undertaking as well.



Changes in the volume of GHG emissions in agriculture, forestry and other land use

Source: The Ministry of the Environment (note 18)

Looking at forestry and other land use, the net volume of GHG emissions is on an upward trend due mainly to the shrinkage of forest areas. Agricultural activities also lead to the erosion of soil. This, in turn, results in soil degradation, inhibiting soil's collective capacities to absorb GHGs, and worsen desertification. These are both major factors behind rising GHG emissions.

Progressing desertification and soil degradation



Note: The left axis represents the growth rate of affected areas (population) compared with 1961 levels.

Source: The Ministry of the Environment (note 18)

Corporations that make a positive impact in terms of emission reduction and carbon capturing measures in agriculture, forestry and other fields

Solutions for the reduced use of nitrogen fertilizers in agriculture

Ginkgo Bioworks, an emerging biotechnology company, is currently being commissioned to conduct projects aimed at producing a variety of useful substances through the modification



of microorganisms' metabolic pathways. The company's notable strength lies in its own intellectual property big data, which it calls its code base. Specifically, the company is accumulating a wealth of DNA sequence data associated with metabolic pathways of and metabolic stimulation for microorganisms by taking full advantage of benefits arising from its business model based on commissioned R&D. Drawing on this data, Ginkgo Bioworks is looking to obtain useful biomaterials from diverse microorganisms and thereby contribute to the enhancement of human well-being and countermeasures against climate change. We expect the company to create a positive impact through these endeavors.

Overview of a Ginkgo Bioworks' business model for agriculture



Source: Compiled by Resona Asset Management based on investor presentation materials published by Ginkgo Bioworks

Decarbonizing livestock farming

Genus provides livestock farmers with branded breeds developed via selective breeding. Commanding robust market shares in countries around the globe, including Japan, the company



offers genetically selected semen to breed livestock with superior features (for example, desirable meat characteristics) for breeding use in a way that aligns with varying demand in each country.

Selective breeding is conducted not only to enhance meat flavor but also raise productivity in terms of the volume of livestock feed. For example, milk production volume per cow has steadily grown in recent years in the United States, achieving an increase of more than 10% over the past decade. The Fund believes that this increase is largely attributable to the introduction of improved breeds, including those developed by Genus and other companies.



Approximately 9.8 tons/year Approximately 10.9 tons/year

Source: Compiled by Resona Asset Management based on statistics conducted by the U.S. Department of Agriculture

GHG absorption via forestry

Weyerhaeuser Company is a real estate investment trust (REIT) possessing the largest forest portfolio in North America. Forest is the Earth's inherent system of CO₂ capturing and storage with unparalleled capacity.



The annual volume of CO_2 absorbed by forests around the globe is estimated at 16.0 billion tons. Of this amount, forestry activities as a whole are believed to be responsible for the absorption of around 1.6 billion tons of CO_2 each year (note 20). Specifically, proper forest management (e.g., tree planting and thinning) is essential to maintaining forests' annual CO_2 absorption volumes, while the use of thinned wood to manufacture durable items is considered beneficial because captured CO_2 will be fixed in this material for a prolonged period of time, instead of being released to the atmosphere. Accordingly, forestry is expected to be a great contributor to reductions in GHG emissions.

Weyerhaeuser is equipped with experience and know-how backed by a long track record dating back more than a century in forest development. Based on these assets, the company is engaged in a variety of activities aimed at maximizing the potential of forests and facilitating the development of forestry. For example, a process it disclosed to quantify the value of forests is expected to provide a basis for the possible expansion of GHG emission credit trading in United States. This will, in turn, contribute to growth in the profitability of forestry.

In addition, if forest areas subject to proper management expand, forestry's overall contribution to reductions in GHG emissions will grow significantly. Looking ahead, we expect this investee to create a positive impact all across the industry.

Science-based estimation of the volume of carbon stored by forests



Source: Weyerhaeuser Company (note 21)

Next-generation carbon capture technologies

Carbon capture technologies collect CO₂ from the atmosphere as well as exhaust gas and are considered essential to achieving net-zero GHG emissions.



Novozymes A/S is a biotechnology company that provides useful substances of biological origin to customers in diverse sectors while also developing enzymes for use in carbon capture. When mixed in water, these enzymes rapidly convert CO₂ into bicarbonic acid (HCO₃), a commonplace, non-harmful substance with no greenhouse effect. Moreover, these enzymes are commonly found in human bodies and other creatures in general. As the company currently seeks to initiate the large-scale marketing of these enzymes by screening multiple candidates and improving those with excellent capabilities, we expect it to create a positive impact going forward.



Mitigation—Carbon Reduction and Capturing Measures in Agriculture, Forestry and Other Fields

What our **future** should look like

Reaching net-zero emissions via the thorough reduction of GHG emissions in the agricultural and livestock sectors along with the development of forestry and carbon capture technologies

Impact targets and corporate contributors (investees)



Provisional calculations aimed at quantitatively measuring the outcome of investee activities in the last fiscal year (outcome: social impacts attributable to corporate activities)

Company name	Impact business/Output	Outcome	Provisional outcome measurement
Genus	Improved pigs and oxen breeds /190,000,000 pigs and 8,000,000 milk and beef cattle	Reduced GHG emissions via the enhanced productivity of livestock rearing	Volume of GHG emissions reduced via the above contribution: Approximately 1,280,000 t-CO ₂ e
Ginkgo Bioworks	Development of new bacteria capable of fixing nitrogen	Development of new bacteria capable of fixing nitrogen	Qualitative measurement only
Novozymes	Enzyme-based carbon capture business	Removal of CO2 from exhaust gas	Qualitative measurement only
Weyerhaeuser	Expansion of forestry business /2,470 acres of company-owned forest	Volume of GHGs absorbed	Volume of GHG emissions reduced via the above contribution: Approximately 35,000,000 t-CO2e

Impact measurement

To determine the magnitude of impacts created via emission reduction and carbon capturing measures in agriculture, forestry and other fields, we have defined the following three impact pathways: (1) reducing emissions in the agricultural field; (2) facilitating forest and land improvement; and (3) utilizing carbon capture technologies. We have thus conducted quantitative and qualitative impact measurement based on these pathways. As part of quantitative measurement, our provisional calculation showed that the volume of GHG emissions reduced in the last fiscal year as a result of the previously-mentioned investees' contributions amounted to approximately 36,280,000 t-CO₂e.

Volume of GHG emissions reduced via the combined contribution of investees



Quantitative measurement

We have estimated the volume of GHG emissions reduced in the last fiscal year via **Weyerhaeuser**'s contribution at approximately 35,000,000 t-CO₂e (based on numerical data disclosed by the company). Forests owned by Weyerhaeuser and its partners absorb approximately 35,000,000 tons of CO₂ each year, with an annual total of 17,000,000 tons of CO₂ being stored by forests managed by the company.

Although timeframes for wooden materials being disposed of and turning into sources of GHG emissions must also be considered, our calculation also determined that trees that have absorbed (and fixed) 18,000,000 tons of CO₂ are being processed at

lumbermills and manufactured into wooden goods, thereby keeping that amount of CO₂ from being released into the atmosphere. As for **Genus**, we have determined that the volume of GHG emissions reduced via its contribution amounted to approximately 1,280,000 t-CO₂e. We conducted this calculation by multiplying the number of livestock (pigs and oxen) born under its supervision in the last fiscal year by the per-capita volume of CO₂ emissions (including those attributable to feed production) during periods leading up to their shipment, and then by deducting the resulting amount with the annual ratio of reductions in such emissions due to genetic improvement.

Qualitative measurement

Ginkgo Bioworks is a biotechnology company equipped with a technological platform designed to enable yeasts and other protists to produce a diverse range of useful substances via genetic recombination. Projects now underway at the company include a joint project aimed at developing nitrogen-fixing bacteria. Roots of fabaceous plants are known to provide a home to bacteria equipped with an ability to fix nitrogen. While bacteria of this type are capable of producing nutrition from nitrogen, which is abundantly contained in the atmosphere, similar bacteria inhabiting corn roots cannot produce nutrition in the regular cultivation environment. In recent years, researchers discovered that the latter type of bacteria are capable of fixing nitrogen only in soil lacking nutrition. Based on this discovery, the aforementioned project aims to genetically reengineer these bacteria to help them be able to fix nitrogen even in regular farmland soil containing fertilizers.

Once this development project is successful, these bacteria will, in turn, enable crops to obtain an additional nutrition from sources other than fertilizers. Accordingly, it is expected that the volume of nitrogen fertilizers used could then be reduced by 40% to 50%.

The volume of nitrogen fertilizers absorbed by crops is considered to account for only around a half of the overall volume of those used on farmland, suggesting that a major portion is being left unutilized and, eventually, changing into dinitrogen monoxide, the greenhouse effect of which is several hundred times stronger than that of CO₂. Furthermore, water containing left-over fertilizer often flows into rivers and other aquatic environments and causes them to be excessively eutrophic. This constitutes another critical problem. In addition, a process for manufacturing ammonia, a raw material for these fertilizers, involves the use of fossil fuels, serving as a large source of GHG emissions. The use of genetically engineered bacteria, albeit being expected to help counter the above issues, requires the resolution of diverse challenges, such as how to control and prevent them from disrupting existing ecosystems. With this in mind, Ginkgo Bioworks is promoting research into methods to prevent negative ecological influence.

If the project succeeds and opens the door for innovative fertilizing methods backed by bacteria-based nutritional production, the volume of nitrogen fertilizers used around the world could be halved. The Fund expects that, as a result, this could lead to cutting global GHG emissions by 3% to 4% in addition to significantly mitigating environmental burden arising from aquatic eutrophication.



Source: Compiled by Resona Asset Management based on the corporate website of Ginkgo Bioworks



Adaptation—Enhancing Disaster Resilience



What is needed

Developing an integrated disaster-prevention structure encompassing both hard and soft infrastructure

Realizing even stronger disaster resilience through the constant and flexible maintenance, management and operation of said infrastructure

Ensuring swift infrastructure restoration in the aftermath of a disaster as well as reconstruction of communities

Growing risks of disasters induced by global warming

Disaster risks grow higher with the escalation of global warming

Today, the escalation of global warming is feared to result in growing disaster risks which threaten human society, especially urban communities. Although phenomena induced by global warming include a range of disasters, such as heatwaves, strong winds and dust storms, the majority of such phenomena are water-related disasters. For example, the growing frequency of extreme weather increases the likelihood of flooding from rivers due to heavy rains. Likewise, frequent occurrences of large typhoons will cause flooding and high tides. In addition, flooding risks could also increase drastically as a result of such socio-economic factors as over-population in particular regions, the ill-planned development near coast areas and rivers, and ground sinking as a result of the excessive extraction of underground water. The World Resources Institute (WRI) analyzes that the number of people affected by river flooding around the world will increase from 65,000,000 to 132,000,000 in the two decades from 2010 to 2030. This analysis also shows that, over the course of the same period, the number of people affected by high tides and sea level rises in coastal areas will increase from 7,000,000 to 15,000,000. Moreover, the WRI forecasts that annual economic losses arising from river and coastal flooding will grow threefold from US\$157 billion to US\$535 billion and tenfold from US\$17 billion to US\$177 billion, respectively.

In addition, coastal areas, especially those in tropical and temperate zones around the equator, are expected to face a significant impact of flooding damage. A large proportion of these areas are located in emerging nations, whose communities include the socially and economically vulnerable. Accordingly, the WRI suggests that an international cooperative framework aimed at assisting these areas in their efforts to develop a robust disaster-prevention structure will be of particular importance ^(note 22).

Annual economic damage arising from water-related disasters around the world



Source: Compiled by Resona Asset Management based on data published by the WRI $^{\rm (note\;22)}$

Growing need for an integrated disaster-prevention system

To date, flooding has been countered via the combination of soft infrastructure, such as early warning systems, and hard infrastructure, such as embankments, with the aim of preventing the loss of human life. However, to develop even more resilient systems, the preservation of green infrastructure is equally important. Namely, the impact of rainstorms hitting coastal areas could be naturally mitigated by mangrove forests, reefs, sand hills and other natural assets. Also, there is a pressing need to develop an extensive, integrated system that includes farmland systems for water management and storage, as well as those for the preservation of soil water content, in addition to updated irrigation systems.

The creation of these systems is not the end goal. They need to be managed properly and flexibly long-term, under supervision by bodies capable of cross-sectional judgment. For example, aging infrastructure such as embankments can expose surrounding communities to greater risk and requires countermeasures.

That being said, it is difficult to ensure that disaster-prevention systems are available to all regions in need of them. Even if these systems are put into motion around the world at an ever-faster pace, a considerable period of time will be required until their completion.

Meanwhile, the pace of the rising sea levels may increase faster than anticipated due to such factors as the collapse of ice sheets. Taking these and other projections into account, we need to develop countermeasures based on a more prudent assumption. These could include the design of habitation areas and infrastructure focused on avoiding disaster risks or, when risks are found to be unavoidable, systematic relocations of existing communities.

We also need to strengthen countermeasures currently in place in preparation for actual disaster damage. Along with securing robust resources for life-saving activities, the restoration of infrastructure (water, energy, logistics, etc.), the distribution of emergency food supplies and other essential measures to be taken immediately after the occurrence of a disaster, we need to develop urban communities equipped with greater resilience and that are capable of smoothly transitioning to a reconstruction process in the aftermath of the disaster.

Disaster resilience and post-disaster reconstruction

Autodesk, Inc. is a leading software company in 3D design. In the mid-2010s, this investee made a drastic shift in business strategy and is now better known as a provider of solutions



encompassing the entire lifecycle of construction and civil engineering (from upstream processes like design to the construction phase and maintenance).

Software developed by the company commands remarkable market shares and has particular strength in the construction and civil engineering fields. In the former, this software is widely used in the installation of disaster-prevention infrastructure and post-disaster reconstruction work. Benefits of using this software include reductions in construction materials expenses, enhanced efficiency and lower maintenance costs thanks to its ability to digitize large construction plans and reproduce them in a virtual environment. Furthermore, this software makes it possible to simulate the status of construction sites, helping to ensure worker safety.

Autodesk's software is similarly used in a range of projects associated with post-disaster facility reconstruction and restoration, with the aim of not only designing and rebuilding infrastructure with higher disaster prevention and mitigation capabilities, but also securing smooth communications with local residents. Although decisions regarding such projects typically require robust communications and consensus with residents and other stakeholders, 3D models created by this software help them envision what their communities would look like after reconstruction and provide a common ground for discussions.

Autodesk's contributions to the enhancement of disaster resilience

- Planning and design of infrastructure with the aim of adapting to climate change and enhancing disaster resilience
- Visualization of projects with an eye to securing harmonious coexistence with the surrounding environment
- Simulation of environmental and social impact of construction design
- Verification of post-completion traffic

Infrastructure design

Construction lifecycle

- Assessment of the appropriateness of land leveling methods and the optimization of the volume of soil to be transported
- Maximization of the effect of projects aimed at preventing inland and coastal flooding
- Management of green infrastructure
- Optimization of sewage networks to prevent flooding
- Optimize end-to-end project lifecycle to reduce redundancies
- Ensure the constant updating of data and the execution of most accurate construction plans to eliminate redundancies arising from redoing
- Predict disaster risks that may arise in the course of construction

Source: Compiled by Resona Asset Management based on investor presentation materials published by Autodesk

GIKEN LTD. is striving to accelerate global expansion and to spread innovation in construction sectors worldwide with the implant method it has developed.



This method involves driving piles into the ground to form strong walls and is considered unprecedented in terms of its superior disaster-prevention effects as it helps build resilient structures capable of safeguarding human life and society against a range of disaster risks, including flooding, high tides, sea level rise, tsunami and landslides. In order to ensure robust preparation for the growing disaster risks faced by regions around the globe, much infrastructure currently in place requires reinforcement work aimed at enhancing its disaster prevention capabilities. Simultaneously, construction firms taking on projects of this kind are typically required to achieve a shorter construction period with lower cost and ensure flexibility in post-construction infrastructure operations. The implant method, which is focused on following the Five Construction Principles (environmental protection, safety, speed, economy, and aesthetics), aptly fulfills the above requirements as it enables space-saving construction with a smaller number of workers.

In addition, this method enables the flexible removal of structures to counter aging-related deterioration by simply pulling out existing piles. Moreover, these piles can be reused at other construction sites. As such, the implant method is considered extremely efficient. Although the implant method boasts a track record spanning more than 50 years, it has greatly gained nationwide popularity in recent years, especially in the aftermath of the 2011 Great East Japan Earthquake. Once this method proved effective in the wake of this devastating disaster, it was adopted by a growing number of projects on the back of ever-higher and nationwide awareness of disaster countermeasures.

GIKEN has also strengthened its overseas sales structure in past several years, paying ever stronger attention to growth opportunities in markets abroad. These endeavors began to yield positive results, with GIKEN being commissioned to handle a part of a major project to be undertaken in Amsterdam, the Netherlands. This project involves the repair of canals, which span 200 kilometers and constitute a World Heritage Site. Although public bidding for this project attracted a number of construction firms boasting diverse methods, GIKEN's proposal earned the highest ratings and thus was successfully selected. Currently, the company has become a subject of growing attention on a global basis after winning this trophy project, which is like a showroom for construction technologies from around the world. Looking ahead, GIKEN is expected to pursue global expansion at an even faster pace.

Artists' rendering of Amsterdam's canals repaired with GIKEN's method



Source: GIKEN (https://www.giken.com/ja/)



Adaptation—Enhancing Disaster Resilience

What our **future** should look like

Development of solid yet flexible disaster-prevention systems capable of adapting to climate change-related risks threatening human life and society

Impact targets and corporate contributors (investees)



Provisional calculations aimed at quantitatively measuring the outcome of investee activities in the last fiscal year (outcome: social impacts attributable to corporate activities)

Company name	Impact business/Output	Outcome	Provisional outcome measurement
Autodosk	AEC* business (Net sales: Approximately US\$2.0 billion)	Efficient and safe construction of buildings and infrastructure with great resilience	Qualitative measurement only
Autodesk	Assistance to startups via the Autodesk Foundation (16,000 projects associated with buildings and infrastructure)	Providing communities that are vulnerable to disasters with greater resilience	Qualitative measurement only
GIKEN The implant method/Implemented in projects worth ¥104.0 billion by GIKEN and affiliate companies		Economic effects arising over 50 years from the construction of resilient infrastructure	Approximately ¥574 billion

*Architecture, Engineering & Construction

Impact measurement

To determine the magnitude of impacts created via the enhancement of disaster resilience, we have defined the following three impact pathways: (1) enhancing the efficiency of disaster countermeasures (2); pursuing technological innovation to achieve improved disaster-prevention functions and; (3) securing greater capabilities for community restoration and reconstruction. We have thus conducted quantitative and qualitative impact measurement based on these pathways.

Quantitative measurement

Our provisional calculation showed that enhanced disaster resilience resulting from **GIKEN's** contribution led to an economic value of ¥574 billion in the last fiscal year. This calculation took into account the estimated scale of construction projects in which the company was involved and resulting disaster-prevention effects that will safeguard river and coastal areas over the course of 50 years.

Having developed the implant method which boasts superior effectiveness in terms of disaster prevention, GIKEN is promoting this method globally. While the company handles multiple businesses, we consider this method to be a central factor for our impact measurement as we have forecast that projects employing it will result in the establishment of social infrastructure that will, in turn, lead to robust disaster prevention and mitigation capabilities over the course of its service life.

Accordingly, the initial process of our measurement factored in the number of relevant construction projects to be undertaken around the world and the volume of funds for such projects, considering

Qualitative measurement

Autodesk provides 3D design software to help digitize construction and civil engineering workflows, thereby contributing to the efficiency of construction work, the safety of construction sites and the structural enhancement of infrastructure resilience. In particular, the improved efficiency of infrastructure construction means that a greater number of facilities can be installed in the same timeframe. Therefore, the Fund is focused on measuring the outcome of the investee's endeavors described above.

Examples of measures afforded by Autodesk's software for higher efficiency include the centralized management of 3D models used by onsite engineers. This enables all of them to engage in smooth communications, thereby contributing to earlier construction launch times. Moreover, although the workload attributable to reworking is considered to account for around 30% of the total workloads required at construction sites, the risk of reworking can be drastically reduced via preliminary 3D simulations aimed at determining such factors as potential interference between structures and the ground on which they will be built.

Among users of this software is a major construction firm based in the Netherlands. This firm has come to use this software in almost all of its projects over the course of two years since its introduction. This, in turn, enabled the firm to shorten the preparation period leading up to the start of construction by 25% compared with conventional projects not using said software. Furthermore, this software is currently being used in a project associated with the updating of Afsluitdijk, a closure-dike that has protected the Netherlands from the inflow of sea water for around 90 years, which is especially important because one fourth of national land lies below sea level.

In post-disaster reconstruction, the software similarly plays an important part by precisely reproducing a 3D model from images and other data regarding the pre-disaster status of target facilities. This technology makes it easier to restore structures from disaster The investee's contributions to the enhancement of disaster resilience



that GIKEN has been securing a growing number of orders for future projects. Recent examples of orders include those received in 2021 in connection with repair work for canals in Amsterdam, the Netherlands, a country known for robust public awareness regarding the danger of flooding. With GIKEN winning a position in this major project, its implant method is now becoming a subject of global attention for its superiority and uniqueness. Thanks to this, the company is succeeding in securing orders for other similar projects. The Fund expects GIKEN to be involved in an even broader range of projects on the back of the accelerating global trend toward implementing robust disaster-prevention measures. Looking ahead, we aim to undertake the more precise outcome measurement by assessing the number of construction projects along with the ratio of projects associated with disaster prevention while calculating the economic value of enhanced disaster-prevention capabilities that will last over the long term. To this end, we will maintain dialogue and engagement with our investee.

damage. It is therefore expected that via the use of Autodesk's technology, Notre Dame, the iconic cathedral in Paris, France, could possibly be fully restored after the partial loss of structure from a large fire.

In addition, the company has established the Autodesk Foundation to extend financial assistance and offer its own software to corporations striving to contribute to society, especially those based in emerging nations. Through this foundation, the company helps these nations enhance their disaster resilience. Beneficiaries of this foundation include a corporation that pursues its mission to provide disaster-resilient housing to people in emerging nations. To this end, this beneficiary aims to help local workers acquire robust construction skills while striving for the sustainable creation of housing demand. Autodesk itself has been engaged in a similar project in Colombia and, via the development of highly efficient, digitized workflows, it has succeeded in shortening the project period by 95% compared with conventional workflows.

The Fund highly evaluates Autodesk for its significant contribution to emerging nations, which are particularly vulnerable to disasters.

Afsluitdijk, a closure-dike in the Netherlands (prior to updating)





Adaptation—Resolving Food and Water Problems



What is needed

Enhancing the resilience and efficiency of existing food supply systems to be sufficiently prepared for climate change-related risks

Achieving technological innovation—for example, producing animal protein replacements from plant-based ingredients

- Facilitating water recycling via the use of technologies while enhancing capabilities to procure fresh water supply

Global warming's impact on fresh water resources and food production

Escalation of global warming leads to unequal distribution of water resources

Experts now predict that risks associated with the supply of fresh water resources could greatly increase with the escalation of global warming. Although a rise in temperature is expected to result in more rainfall on a global basis, these rainfalls are likely to be geographically uneven, leading to another issue.

While a 4°C rise in global temperature could result in a greater volume of rainfalls in polar regions around the north and south poles as well as areas across the oceans around the equator and some wet tropical areas in Asia, that same temperature rise will lead to a decline in the rainfall volume in subtropical and tropical dry areas ^(note 23). In other words, global warming is expected to add more water to already wet regions while depriving dry regions of their already-scarce water resources.

Direct and indirect impact of temperature rise on water resources

The indirect impact of temperature rise is expected to include a 10% to 30% decline in rainfall volume in tropical and subtropical dry areas due to the resulting change in rainfall patterns. In terms of direct impact, the volume of snowmelt water is expected to decrease over the long term, affecting one sixth of global population dependent on this water resource ^(note 24). Moreover, rising sea levels are believed to eventually reach soil layers containing groundwater reservoirs that provide well water currently being used in many regions. Communities in these regions, especially those in coastal areas, will thus be exposed to higher risks arising from well water salinity ^(note 25).

Climate change's impact on the volume of agricultural crops

According to observational data for past 50 years, climate change is deemed to have caused the volume of agricultural crops to decline in tropical and subtropical areas. On the other hand, it has been suggested that the volume of crops has increased in high latitude areas and other regions where rainfall volumes have been increasing.

If global warming escalates further, although the volume of crops may increase in some regions, many other regions, especially developing countries, are expected to face major challenges arising from the declining volume of agricultural crops. Changes in the volume of key cereal crops confirmed over the period from 1960 to 2013



Source: Ministry of the Environment (note 26)

Impact on livestock farming

Cereals such as corn are essential to meat production. In general, livestock raised for meat production is given a large volume of cereals in addition to pasture grass, as the former is highly beneficial to livestock's growth and meat flavor.

A cow and pig require 11 kilograms and 6 kilograms of corn to produce 1 kilogram of meat. Accordingly, meat production will be significantly affected by the climate change-induced decline in the volume of cereal crops.

Today's mainstay livestock feed includes corn and soy, both of which are produced mainly in the United States, China and Brazil. Research undertaken to predict the global warming's impact on cereal crop volumes over the period leading up to 2070 suggests that if temperatures rise between 2.6°C and 4.8°C by the end of 2100, the volume of corn to be harvested in these three countries will decrease by around 20%. The same research also forecasts that the volume of soy harvests will decrease by around 30% and 50%, respectively, in the United States and Brazil. It is thus predicted that crop volumes will decrease considerably (note 27).

Amid ongoing global population growth, the livestock sector is expected to face worsening issues hampering its sustainability as climate change escalates, as the sector is dependent on large amounts of farmland both for raising livestock and producing the large volume of cereal crops to feed it. This projection calls for solutions that take advantage of both existing and new technologies. These solutions range from selective breeding, biotechnologies to the efficient synthesis of animal proteins, as well as the elimination of food loss and shifting public behavior.

Resolving water problems

According to the World Meteorological Organization (WMO), more than 2 billion people around the world live in regions with high water risks (note 28). Looking ahead, the seriousness of water depletion confronting these people will increase due to climate change.

Xylem Inc. upholds a clearly defined purpose of delivering solutions to water problems through its business and is the largest company of its kind. The company boasts a diverse lineup consisting



of water pumps, measurement equipment, water treatment equipment and other products across the water lifecycle from water intake to wastewater treatment.

We have great expectations for the company in terms of its contribution to both the reduction of water loss, which is mainly attributable to leakage from water pipes, and the recycling of water (via a closed loop) as we believe that these two endeavors will become matters of extreme importance.

Ecolab Inc. is a global industrial chemical company contributing to a shift toward energy saving in a

of operational safety.



The company is strongly focused on delivering products capable of providing clients with environmental and economic benefits. Moreover, Ecolab is among one of a handful corporations with capabilities to quantitatively measure the added value of products while maintaining a diverse lineup. The company also contributes to reduced water resource consumption via water saving. In addition to creating this major outcome, Ecolab is thus able to visualize the impact of its activities based on its quantification framework for the added value measurement. The Fund considers this framework to be distinctively unique and worthy of high evaluation.

As a founding member of the Water Resilience Coalition-an industry-driven, CEO-led coalition of the UN Global Compact CEO Water Mandate— the company is striving for improvement in fresh water usage in 11 regions with high water risks around the world under specific quantitative targets for the period leading up to 2030. Ecolab is also engaged in the water treatment business in high water risk regions. Accordingly, the company is expected to make major contributions to target setting and other collective endeavors based on its track record. The Fund also has great expectations for a positive spillover effect to be created by the aforementioned initiative.

Recovery in the volume of agricultural crops through land improvement

Desert Control AS is an environmental technology company founded in Norway, with the objective of restoring the fertility of farmland that has turned into desert. To this end, the company



takes full advantage of a unique land improvement technology it has developed. Specifically, this technology involves the use of liquid natural clay (LNC) which consists of soil, water, minerals and other ingredients. Once this product is dispersed on land, it improves the ground's water retention and turns desert into fertile land on which plants can grow.

LNC is produced onsite with special trucks equipped with LNC mixers to finely tune the composition to meet differing needs arising from local land conditions and the crops being cultivated there. Moreover, LNC can be dispersed using regular irrigation systems and sprinkler systems. These features lend the company distinctive strength.

In fiscal 2022, LNC was commercialized in the United Arab Emirates. Furthermore, testing is steadily under way in the United States. Accordingly, we expect it to create an impact via commercialization in this country.

Enhancing the resilience and efficiency of livestock farming

Genus is a provider of swine and bovine genetics for producing branded meats based on selective breeding. The company is a pioneer in terms of adopting a science-based breeding approach



through which it successfully determined relationships between the DNA sequences and characteristics of swine and bovine. As of 2021, Genus commands first and second place in the global market share of swine and bovine genetics products, respectively. We expect that, first and foremost, the company will help raise the productivity of livestock farming through the provision of superior livestock genes. In general, livestock rearing requires a good amount of feed, the weight of which would be several times to several ten times larger than the weight of each animal itself. However, if new bovine and swine breeds are equipped with greater meat flavor and capable of growing at a smaller volume of feed, livestock farmers' profitability will be improved via the reduction of feed amount. Secondly, Genus technologies could contribute to disease prevention. Countermeasures against viral diseases constitute an extremely important part of food problem solutions. Well before gene-based medicine for humans becomes widespread, genome editing technologies for livestock will be put into practical use to prevent animal diseases, including those that can be fatal to a great number of livestock animals. In this light, Genus has succeeded in breeding pigs with full immunity against porcine reproductive and respiratory syndrome, a viral disease, through genome editing. The company is now looking to commercialize this new technology in the near future. Taking these factors into account, we expect Genus to remain a pioneering biotechnology company in the livestock field.

Food problems in impoverished communities

Euglena is engaged in the production of a nutrient-rich alga, which bears the same name as the company, to help realize a sustainable society. While this alga boasts diverse applications,



we expect it to be particularly useful for food applications. If a global food crisis arises as is currently predicted, emerging nations and other relatively poor communities are expected to suffer to a greater degree. Euglena contains a total of 59 types of diverse nutrition, including protein, an essential nutrient to support human survival. Accordingly, it has become a subject of growing public expectations as it could possibly help maintain lives of many people and contribute to their well-being amid a food crisis (note 29).

While expanding its business in Japan, Euglena has launched the marketing of a furikake (rice seasoning) containing Euglena in Bangladesh, a major rice producer. As this business involves working together with a local corporation to jointly develop a product capable of delivering supplementary nutrition that rice lacks, we expect the company to help maximize benefits arising from a virtuous cycle of economic growth and the mitigation of nutrition problems. In addition, we found Euglena to have potential to create a major impact in terms of improving living standards of other emerging nations and impoverished communities vulnerable to a risk of food crisis.

Because Euglena is capable of generating nutrition via photosynthesis, it could serve as a source of protein without a large environmental footprint like those attributable to livestock farming and other food production activities. We believe that the advantages of Euglena will become even more profound if the company succeeds in expanding its production volume and improving its quality.



Adaptation-Resolving Food and Water Problems

What our **future** should look like

Establishment of water procurement and food production systems equipped with resilience and capable of adapting to climate change-related risks and supporting global population and economic growth

Impact targets and corporate contributors (investees)



Provisional calculations aimed at quantitatively measuring the outcome of investee activities in the last fiscal year (outcome: social impacts attributable to corporate activities)

Company name	Impact business/Output	Outcome	Provisional outcome measurement
Xylem	Measurement equipment for water infrastructure and water treatment business	Reduction of water loss and the promotion of water reuse	Volume of water resource consumption reduced via the above contribution Approximately 1,520 billion liters
Ecolab	Water treatment business	Promotion of water saving and reuse	Volume of water resource consumption reduced via the above contribution Approximately 814 billion liters
Desert Control	LNC business	Reductions in the volume of water and fertilizers used and improvement in agricultural productivity	Qualitative measurement only
Genus	Provision of livestock (swine and bovine) genes and the prevention of animal diseases/ 190 million pigs produced by clients from supplied genes	Contribution to improvement in farmer income by, for example, helping to raise the efficiency of feed consumption	ABS segment (bovine): Qualitative measurement only PIC segment (swine): Profit achieved by clients as a whole Monetary value of improvement: Approximately US\$670 million
Euglena	Euglena production volume	Improvement of health conditions among citizens of impoverished countries	Qualitative measurement only

Impact measurement

The Fund believes that food and water problems are closely intertwined. With this in mind, we have identified three impact pathways that are most likely to contribute to the resolution of the aforementioned problems. These pathways are: (1) strengthening capabilities for the procurement of fresh water and the preservation of its sources; (2) enhancing existing food production capabilities while improving production efficiency; and (3) exploring alternative foods. We have thus conducted quantitative and qualitative impact measurement based on these pathways.

Quantitative measurement

Xylem reported that the company contributed to preservation totaling 1,520 billion liters of fresh water in the last fiscal year. Specifically, it utilized IoT devices in water piping systems to prevent water loss by ensuring speedier implementation of water leakage countermeasures. In addition, the company also made it possible to reuse water via water treatment employing ozone/UV disinfection technologies.

According to its own reporting, **Ecolab** helped save 814 billion liters of water through its water treatment business. Drawing on its unique technologies, Ecolab provided water treatment chemicals as well as digital real-time monitoring systems, thereby helping its clients reduce water consumption by 30% to 40% per facility. At the same time, Ecolab contributed to the reduction of energy consumption by, and GHG emissions from, these client facilities by around 18% to 20% and around 12% to 13%, respectively. As for **Genus**, a provisional calculation by the Fund showed that this investee helped clients to achieve an approximately US\$670 million increase in profit through its swine sector business. This calculation is based on the added monetary value on the genetic improvement realized by its customers in the last fiscal year in connection with nearly 200 million pigs born from its gene portfolios.

Volume of water resource consumption reduced via the above contribution

2,334 billion liters

Improvement in farmer profit

US\$670 million

Approximately

Genus also handles the bovine sector business (milk and beef cattle business). Looking ahead, we intend to include this business into the scope of quantitative measurement.

Qualitative measurement

Desert Control is a Norway-based agri-tech company combatting the desertification of the Earth via land improvement. The liquid natural clay (LNC) developed by the company was created to improve farmland that has turned into desert, with the aim of restoring its former fertility and reenabling plant growth. The company began commercializing the LNC in the Middle East, where this product was tested at client sites ahead of other regions.

Similar validation study is currently underway in partnership with University of Arizona in the United States. In light of the possible commercialization of LNC in the United States, we expect its use to become more widespread going forward.

According to materials published by the company, 12 million hectares of land turns into desert each year, and 52% of farmland on the Earth is now deteriorating. Desert Control states that, for the company to disseminate the sufficient volume of the LNC on 12 million hectares of land every year, it needs to operate seven hundred LNC manufacturing facilities. Although the current number of such facilities totals just several tens of units, the company's plans call for building new facilities at a faster pace starting in fiscal 2023.

In the course of dialogue with this investee, we aim to confirm such matters as the geographical scale of (or areas covered by) its activities to prevent desertification, and the degree of resulting improvement in agricultural productivity. Testing conducted thus far shows that productivity improved by 17% to 62%. We also deem it necessary to suggest technological licensing to external parties as a viable option. From a perspective of creating impacts, smoothly expanding the scale of this business will be a matter of particular importance and a major issue to be tackled.

Although Desert Control was founded in Norway, a country

without any deserts, the company clearly aims to contribute to the Earth's environment as a whole. The Fund therefore expects it to create a profound impact that will positively affect this planet.

Land on which Desert Control's LNC was dispersed



Source: Desert Control AS (note 30)



Comprehensive Solutions for Mitigation and Adaptation



What is needed

- Comprehensive solutions supporting mitigation and adaptation measures
- Foundations for creating innovation
- Facilitating the resolution of issues via investment

Technological foundations and comprehensive countermeasures to promote mitigation and adaptation measures

Technological development associated with mitigation and adaptation

According to a provisional calculation by the Intergovernmental Panel on Climate Change (IPCC), the global community needs to achieve a 43% reduction in its GHG emissions by 2030 compared with the 2019 level to ensure that the global temperature rise during the period leading up to the end of the 21st century is no greater than 1.5°C. IPCC experts also suggest that achieving the reduction in GHG emissions envisioned above will require a scaling up of investment in relevant technologies and infrastructure on the order of three to six times the current level.

The following analysis of various technologies regarding their potential to curb GHG emissions and their costs indicates that wind power, solar power and other renewable energy generation methods offer a lot of economically viable options for promoting major reductions in GHG emissions by 2030.

Analysis of various technologies regarding their potential to curb GHG emissions by 2030 and their costs

Billion tons of CO2e/year



*1 Carbon capture and storage

 *2 Switchover to electric power, natural gas, biofuel or hydrogen
 Note: The above graph shows the estimated average of additional costs incurred to achieve a 1 billion ton reduction in GHG emissions.
 Source: Prepared by Resona Asset Management based on data published by the IPCC.

Although using CCS technologies at thermal power plants has a lot of potential regarding the reduction of GHG emissions over the long term, the potential of such technologies to curb emissions in the period leading up to 2030 is said to be limited, while estimated costs for these technologies are considerable. Other solutions include introducing electric vehicles (EVs), which are expected to gain great popularity in the long term, and utilizing such alternative energy sources as electric power instead of fossil fuels to provide heat to or otherwise operate industrial machinery. However, such solutions are similarly beset by problems discussed above.

The global community is thus facing a pressing need to develop unprecedented technological solutions even as it promotes conventional mitigation and adaptation measures and, to this end, constantly upgrades existing technologies that support them.

Roles of governments, businesses and investors

According to the United Nations Office for Disaster Risk Reduction (UNDRR), over the past two decades a series of climate-related disasters have claimed a cumulative total of more than 1.2 million lives and affected more than 4 billion people (note 31).

The industrial revolution, a landmark event in human history, brought with it major structural change with the remarkable transition from an agriculture- to industry-driven economy. Capitalists played a key role in this transition through the transfer and concentration of capital. This concentration, in turn, allowed business interests to obtain the massive financing needed to embark on the competitive pursuit of longer railroads, heartier steam locomotives, and larger steelworks, thereby ushering in the golden era of the fossil fuel-based industry.

Now, however, in order for society to resolve the problem of climate change, major aspects of this mega-structural change must be disassembled and redefined. It is also evident that an initiative of this kind will be extremely hard to complete unless all stakeholders around the globe work in union.

In this regard, national governments are being called on to set appropriate incentives for the facilitation and popularization of mitigation and adaptation measures. Moreover, they are expected to simultaneously provide negative incentives to discourage the use of older-generation technologies that exacerbate climate change. In these ways, negative externalities must be countered through the development of necessary legal systems. Meanwhile, business corporations are being urged to develop and provide technologies that will contribute to mitigation and adaptation as well as to restructure their business models and otherwise create new modes of operation premised on changes described above. Lastly, investors are being pushed to act on their acute awareness of their responsibilities, to function as catalysts that powerfully assist in the realization of needed changes via financing.

Promoting transition to net zero through the capital market

As a world-leading stock index provider, MSCI is best known for various indexes bearing its name. At the same time, MSCI has defined its mission as "enabling the investment community



to make better decisions for a better world" and, to this end, has pursued business development in a way that serves the greater good.

Guided by the aspiration of its founder & CEO to promote sustainability, MSCI has become an industry forerunner in terms of providing ESG-related stock indexes and research-related products. In recent years, this firm has also focused on introducing climate change-related products in light of their growing importance.

As the need for massive investment in climate change countermeasures is clear, obtaining financial assistance from the capital market is essential. Meanwhile, a portion of investors, aware of the investment needs described above, have already begun shifting their capital allocation approaches in the capital market. However, capital allocations could fail to realize their intended effects if not based on well-informed judgements.

Looking ahead, the Fund expects MSCI to appropriately fulfill a catalyst function and serve as a helpful tool supporting investors who seek to make better decisions, which will, in turn, generate an indirect yet significant impact.

Facilitating technological innovation

Resolving the climate change problem will require technological breakthroughs in every field. It is therefore considered essential to bring to bear unprecedented concepts to create innovative technologies in addition to upgrading existing technologies.

Ansys is a leading company in the field of computer simulations. Its software products are used in the development of a range of products as they are capable of reproducing a virtual



environment in which various physical phenomena involving such factors as heat and pressure are simulated. These simulations not only help shorten development periods in a significant way, but also enable developers to verify certain concepts that had been extremely hard to demonstrate physically.

In addition, Ansys software products have also been used in the development of EVs, helping shorten overall development periods by 50% and enabling a 12% improvement in battery energy density and efficiency ^(note 32). Furthermore, they are expected to contribute to the development of autonomous driving technologies. Specifically, they will play a part in on-the-road driving tests that will entail travelling a distance of several billion kilometers to verify the safety and reliability of autonomous driving—tests that would be hard to complete without the aid of simulations. It is estimated that once autonomous driving technologies are established, the severity of traffic jams across society will be mitigated by around 35% by 2050, with the volume of GHG emissions attributable to automobiles expected to be around 21% lower than the current level (^(note 33)—a provisional calculation based on EV life cycle emissions).

With regard to Ansys, the Fund expects its software products to exert a large, albeit indirect, impact by enabling significant reductions in the time and costs required to develop the innovative technologies needed to resolve climate change-related issues. Provide software designed to enable various simulations in a virtual environment



Capable of reproducing physical phenomena to conduct precise verification →Contribute to the shortening of development periods necessary to create new technologies

Source: Compiled by Resona Asset Management

Facilitating transition through supply chains

Coupa Software is a leading company in the field of software related to corporate purchasing. Specifically, this firm provides software designed to enable businesses to smoothly purchase various goods in the course of corporate activities.



The overall flow of a corporation's purchasing activities is collectively referred to as its supply chain. Today, a growing number of businesses, especially large enterprises, are being called upon to tackle the issue of how to better fulfill their responsibilities associated with their supply chains. In the context of addressing climate change-related issues, there are a number of instances in which the responsibility to reduce GHG emissions cannot be laid solely upon individual corporations. Rather, a corporation's overall GHG emissions volume should be managed with the inclusion of Scope 3 emissions, which factor in the emissions of its supply chain.

Coupa Software provides an all-encompassing platform created to serve both procurers and suppliers. This platform is equipped with supply chain design functions that set it apart from other similar products and enable it to help users optimize their supply chains based on quantitative data regarding environmental footprints and other factors. The Fund expects Coupa Software, through the provision of said platform, to facilitate a shift in corporate behavior and significantly contribute to the optimization and reduction of Scope 3 GHG emissions.

Enabling supply chain optimization Providing a platform



Source: Compiled by Resona Asset Management





Provisional calculations aimed at quantitatively measuring the outcome of investee activities in the last fiscal year (outcome: social impacts attributable to corporate activities)

Company name	Impact business/Output	Outcome	Provisional outcome measurement
MSCI	Value of corporations included in ESG- and climate change-related indices/US\$227 billion Other relevant indices and research business/US\$350 million	Facilitation of a positive shift in the capital market via the quantitative assessment of climate change-related risks and opportunities associated with investor portfolios	Qualitative measurement only
Ansys	Simulation software/Annual contract value of US\$1.9 billion	Facilitation of the development of technologies related to climate change countermeasures and the reduction of development costs	Qualitative measurement only
Coupa Software	Platform management/Transactions worth US\$981 billion handled on its platform	Realization of decarbonization for entire client supply chains	Qualitative measurement only

Impact measurement

We have identified three impact pathways that could lead to the creation of solutions in a broad range of areas, including comprehensive solutions for mitigation and adaptation. These pathways are (1); facilitating technological development associated with mitigation and adaptation; (2) aiding in the reduction of

supply chain GHG emissions (Scope 3); and (3) facilitating innovation via investment. Although our impact measurement is currently focused on qualitative aspects, we strive to initiate quantitative measurement going forward and, to this end, have defined output indicators while maintaining discussion with investees.

Qualitative measurement

Ansys contributes to the acceleration and streamlining of R&D activities undertaken by its client corporations.

Although the use of simulation is highly beneficial in R&D, the licensing of simulation software is often expensive, making it difficult for startups to utilize this technology due to their limited budgets and resources. Aware of this problem, the company launched the Ansys Startup Program, which allows the use of various software products at a reasonable price.

Today, approximately 1,500 startups subscribe to this program. These include a number with great potential for innovation in terms of business initiatives aimed at countering climate change. For example, Quaise, Inc, a tech startup born from the Massachusetts Institute of Technology in the United States, aims to establish a revolutionary geothermal power generation method by using Ansys software.

Geothermal power is expected to serve as a near limitless source of low-cost energy because as soon as drills from a given area reach an ultradeep underground level of 20 kilometers, a heat source of approximately 500°C is consistently available. However, conventional drilling methods cannot reach deeper than 12 kilometers underground, requiring 20 years to attain this depth. This makes it impossible to freely utilize geothermal energy.

To address this challenge, Quaise is striving to develop drilling technology that uses electromagnetic waves (millimeter waves) to melt rocks and turn them into ash that can be easily removed. However, the design stage of this technology necessitated the assessment of various factors, such as millimeter waves' behavior under deep underground pressure and the impact of the dissolution of rocks. This was a major obstacle as the practical testing of the technology was deemed too costly and difficult. However, this challenge was overcome thanks to the use of the aforementioned program, which enabled the company to shorten the testing period and cut back on testing costs. Currently, the company's plans call for replacing existing coal-fired thermal power plants with geothermal ones that do not produce CO2 emissions by 2028. If this drilling technology becomes widely available, there would no longer be inequalities between countries with rich resources and those with less.

The Fund expects that the startup program offered by Ansys will serve as a catalyst to establish promising technologies and greatly contribute to the resolution of the climate change problem. Meanwhile, The Role of Capital in the Net-Zero Revolution published by MSCI provides the analysis of representative equity indices formulated by the company and now comprised of approximately 9,000 listed corporations from 50 countries, including developed and emerging nations, with their total market capitalization amounting to more than US\$70 trillion. This analysis revealed that the annual total volume of GHG emissions from these corporations amounts to 11.2 billion t-CO2e. Considering that the annual global volume of net GHG emissions is estimated at 59 billion t-CO2e based on the IPCC's Sixth Assessment Report amounts, emissions from these listed corporations account for around 20%. In addition, the company anticipates that if they fail to implement reduction measures, the volume of their annual total GHG emissions will amount to 16.8 billion t-CO2e in 2050. Should this scenario come into reality, the global temperature in 2100 will rise 3.5°C from pre-Industrial Revolution levels. MSCI thus emphasizes the pressing need to take action to reduce GHG emissions to net zero. To facilitate such action, the company began providing a solution called MSCI ACWI IMI Net-Zero Tracker. This solution is designed to visualize consistency between the volume of emissions from each company included in equity indices and overall emissions associated with these indices and the scenario stipulated under the Paris Agreement to curb the rise in global temperature to 1.5 $^\circ$ C or lower. It is expected that the Tracker makes it possible to identify corporations and sectors lagging behind in terms of emission countermeasures and, therefore, helps to facilitate both corporate initiatives as well as engagement of the capital market. Also, the Fund is engaged in the ongoing exchange of opinions with MSCI regarding the possibility of the creation of larger impacts. For example, since MSCI commands remarkable shares in high-quality ESG ratings, our discussions with the company now include such topics as quantifying and scoring not only footprint information associated with each corporation (e.g., how much water it uses for the business) but also its business handprint, namely, positive impacts on society. We also expect that this endeavor could enhance competitiveness of MSCI's products and increase financial return for the company. Accordingly, we consider it to be a significant form of equity value assessment. In sum, the Fund anticipates that once MSCI's initiatives gain further influence, they will result in both a profound impact and financial return over the medium to long term.

Screen capture of software provided by Ansys to simulate the behavior of millimeter waves



Comprehensive Solutions for Mitigation and Adaptation

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Dialogue and Engagement Activities Undertaken by the Global Impact Investment Fund (Climate Change)

Serving as a long-term partner for corporations striving to resolve social issues with noble intentions

The Fund has defined its basic stance to dialogue and engagement as "serving, over the long-term, as a running partner for corporations striving to resolve social issues with noble intentions." Based on



Achievements in dialogue and engagement activities: From September 2021 until the end of September 2022

57 instances of individual dialogues with investees

Outline of Activities

Over the course of the past year (from September 2021 until the end of September 2022), we conducted 57 dialogues and engagement events aimed at assisting investee corporations over the long term. As we deem it extremely important to develop a shared understanding with investees and constantly engage with them on equal footing, we conduct meetings on various occasions to explain concepts of the Fund and exchange opinions regarding how they can contribute to the resolution of climate change-related issues.

These meetings also involve discussion regarding how to develop an even more precise logic model, which serves as a key to promoting impact measurement management (I/MM)—an important aspect of impact investment—as well as what methods they should adopt to quantitively calculate outcome and impact.

Achievements

We have received positive feedback from investee corporations on our concepts and found them to be quite amenable toward the maintenance of dialogue over the long term.

In addition, some corporations have asked us to hold additional meetings specifically focused on exchange of opinions on the disclosure of non-financial information. Recently, the number of such requests is growing as an increasing number of listed companies are now keenly conscious of the need to disclose non-financial information, which has become a key element in investment decision making. On the back of growing public interest in ESG, SDGs and other sustainability issues, listed companies are shifting their focus to contributing to society while securing profit. On the other hand, investors are looking to assess how corporate pursuits of social contribution result in earnings and seeking to evaluate equities they hold based on such pursuits. However, there still remains a large gap between corporations and investors in their understanding of such matters. We intend to fill this gap and help create greater value to support the creation of impact.

this definition, we strive to embody the three points described

below. Through the practice of this stance, we aim to maintain

constructive dialogue with investee corporations so that we are

An excerpt from meeting materials used in discussion with investee corporations

MSCI's unique contribution to net-zero

key contributions we 1. Allocate investme 2. Facilitate or help	assume: ent towards companies e M SCI indexed companie	nable energy transition s to cut scope 1 emission	
Activity & input	Output Dutput Output KPI AUM, Subscription	Outcome Out come KPI (Current annual	impact Impact KGI : Global GHG
	revenue from related business	emissions of MSCI ACWIIMI → 11.1 G ton of CO2e)	emission (CO2e)

Key question:

Could the ESG rating incorporate positive impact ?

- e.g. Scope 3's flaw: it does not contemplate an avoided emission on someone's scope 1 (in other words, scope 3 emission cannot be negative)
- It should be useful for an active investor if there would be a sophisticated tool used for positive screen

Genus

tigation Emission reduction and carbon capturing measures in agriculture, forestry and other fields

Corporate overview

Genus plc is a U.K.-based biotechnology company whose main business is the provision of bovine and swine genetics for producing branded meats based on selective breeding.

The company is a pioneer in terms of adopting a science-based breeding approach through which it successfully determined relationships between the DNA sequences and characteristics of the resulting meat. As of 2021, Genus commands first and second place in the global market share of swine and bovine genetics products, respectively.

From the perspective of mitigating climate change, genetically improved livestock is now attracting growing attention due to its potential to improve the efficiency of crop consumption and thereby help reduce GHG emissions.

Direction of dialogue and engagement

The Fund strives to create an impact aimed at realizing its intention while, at the same time, acquiring economic return, that is, investment profit. To this end, we need to not only determine that our investees are capable of creating an impact but also confirm that financial value they create correlates, to a certain degree, with such impact. As an investor, we also deem it necessary to quantitively measure their achievements in addition to qualitatively analyzing how they create impact and assessing the scale of this impact.

We have examined Genus' disclosure materials to assess the outcome of its corporate activities in terms of impact it has created through the livestock industry as a whole based on chronological analysis of rises in livestock's economic value and production efficiency since the introduction of genetically improved breeds. According to these materials, the company's contribution to the improvement of pig farmers' income is estimated at approximately US\$700 million in the last fiscal year. This achievement is considered to be the result of the company's consistent efforts to improve genetic features of livestock.

Looking at the relationship between the above outcome (an improvement in farmer income) and stock prices, although these two factors have gone hand in hand until the end of 2021, Genus' stock price is currently on a downward trend.

As of September 2022, approximately 40% of the company's

Progress in dialogue and engagement

We have conducted dialogue with Genus on multiple occasions even before commencing investment. Through this dialogue, we have come to learn that its potential to create impact has become greater than ever before thanks to the superiority of its scientific breeding approach as a biotechnology company in addition to such external conditions as a radical decline in costs associated with DNA sequencing.

Also, Genus representatives stated that although the added value of its products has been considered to consist of economic value alone, they believe that corporate contribution to sustainability will be an essential component of their added value going forward. As part of initiatives guided by this belief, Genus has initiated a project aimed at quantitatively assessing the volume of GHG In terms of adaptation, the breeding of genetically improved livestock is expected to result in positive impacts for farmers by, for example, enabling them to produce offerings with higher added value and helping them enjoy larger income and greater productivity. In addition, we highly anticipate the company's potential to develop new livestock breeds that are resilient against diseases.

Resolving food

and water problems

Adaptation



market capitalization is considered to be attributable to the above outcome alone. However, as Genus continues to deliver results to society, we expect its earnings structure to remain viable and consistently be powered by the social outcome it creates.

Currently, we are engaged in the ongoing exchange of opinions with Genus regarding how to better enable its investors to utilize non-financial information on topics exemplified above and in what ways the company should incorporate that information into the evaluation of management performance.



Note: Improvement in farmer income represents total for each fiscal year. Stock price is based on the price at the end of each fiscal year. Source: Compiled by Resona Asset Management based on reports issued by Genus for investors and data published by Bloomberg.

emissions from farmland. Acting in collaboration with a partner company that possesses the satellite-based GHG measurement technology, Genus now seeks to combine its own accessibility to top 100 user farms in 80 countries around the globe with satellite data and other input from said partner, with the aim of jointly developing the world's most precise, universal and efficient measurement platform.

Through this project, Genus made a significant step in terms of precisely measuring the outcome of its corporate activities. We expect Genus to utilize this project as a springboard to enhance its business execution capabilities, facilitate stakeholder understanding and secure greater momentum in the creation of impact.

Enphase Energy

Mitigation Strengthening renewable energy source supply capabilities



Corporate overview

Enphase Energy was established in 2006 in California, United States and is currently engaged in the development, production and sale of microinverters for use in solar panels installed primarily on residential rooftops. The company's microinverters, a component of solar panels, help enhance power generation efficiency and thus make it possible to install solar panels even in locations that have otherwise been considered ill-suited for solar power generation.

In addition, the company has constantly updated itself as a comprehensive energy solution provider by, for example, releasing a smartphone app designed to enable users to visually

Direction of dialogue and engagement

The Fund strives to create an impact aimed at realizing its intention while, at the same time, acquiring economic return, that is, investment profit. To this end, we need not only to determine that our investees are capable of creating an impact but also confirm that financial value they create correlates with such impact. As an investor, we also deem it necessary to quantitively measure their achievements in addition to qualitatively analyzing how they create impact and assessing the scale of this impact.

We provisionally calculated the outcome of Enphase Energy's corporate activities in reference to data it discloses regarding the volume of microinverters and other products shipped as well as their collective contribution to power generation capacities. Based

Progress in dialogue and engagement

We launched dialogue with this company even before initiating investment. As the company defined its purpose as "advancing a sustainable future for all," we were able to smoothly win its empathy toward our intention. We have started discussing methods for the provisional calculation and quantification of the outcome of its corporate activities, ironing out differences in, for example, calculation logic in order to enhance the precision of outcome measurement. As we also anticipate the future expansion of the storage battery and other relevant industries, we will maintain in-depth discussions with this company regarding matters described above. check power generation status, combining solar panels with storage batteries and EV charging systems and otherwise delivering a range of solutions centered around solar power generation. Currently, its sales channels include the United States and also Canada, Mexico and elsewhere in the Americas, as well as Australia and Europe. We highly appreciate the company's capabilities to deliver solutions aimed at enhancing power generation efficiency and thereby stepping up energy supply from renewable energy sources. We thus expect Enphase Energy to achieve future business expansion.

on the above calculation, we have determined that the volume of GHG emissions reduced in 2021 via the popularization of solar power generation amounted to 7.2 million t-CO₂e.

We also regard the company to have future potential to achieve a greater outcome primarily through the following three pathways: (1) expansion of shipping volume of microinverters, its core product; (2) continuous improvement of microinverter performance; and (3) provision of new solutions, including a microgrid development business. Looking ahead, we will continue to engage with this company to exchange opinions on, and otherwise discuss, how to address the three pathways named above and how to publicly disclose its initiatives to this end.

On the other hand, because the company is relatively young, the content of its information disclosure is less than robust, especially in the area of non-financial information. The company is of course aware of these shortcomings and is currently striving to increase staffing and otherwise rectify the situation. The Fund will continue to engage in discussion with and encourage the company to step up information disclosure so that investors can appreciate its potential to achieve constant growth in terms of outcome. In this way, we will support its pursuit of greater corporate value.



GIKEN LTD.

Adaptation Enhancing disaster resilience

Corporate overview

GIKEN LTD. is striving to accelerate global expansion and to spread innovation in construction sectors worldwide with the implant method it has developed. This method involves driving piles into the ground to form strong walls and is considered unprecedented in terms of its superior disaster-prevention effects as it helps build resilient structures capable of safeguarding human life and society against a range of disaster risks, including flooding, high tides, sea level rise, tsunami and landslides. In order to ensure robust preparation for the growing disaster risks faced by regions around the globe, much infrastructure currently in place requires reinforcement work aimed at enhancing its disaster prevention capabilities. Simultaneously, construction firms taking on projects of this kind are typically required to achieve a shorter

Direction of dialogue and engagement

Building on more than 50 years of history since its founding, GIKEN has entered a new phase in which it aims to achieve significant growth toward becoming a global company. Through the globalization of its business, GIKEN is expected to create an impact the Fund aims to support.

In 2020, the company's leadership was transferred from Akio Kitamura (current Executive Chairman), who is the founder of GIKEN and the inventor of the implant method, to President Shinnosuke Moribe. As such, the company is poised to push ahead with corporate reforms on diverse fronts.

President Moribe is now taking the lead in organizing GIKEN's corporate information as a global company as well as developing a structure for ensuring the appropriate disclosure of this information. Through periodic meetings, we have provided him and other



Although the implant method boasts a track record spanning more than 50 years, it has greatly gained nationwide popularity in recent years, especially in the aftermath of the 2011 Great East Japan Earthquake. Moreover, GIKEN has strengthened its overseas sales structure in past several years, with the looming risk of natural disasters calling for the acceleration of the global marketing of said method.

GIKEN representatives with the following three proposals aimed at helping the company improve its corporate value.

In response, they have stated that in light of the passage of 50 years since its founding, they understand that it is time for GIKEN to execute organizational restructuring in every sense. However, they have been confronted by difficulties in determining what to do due to the lack of knowledge and experience. GIKEN has thus found Resona Asset Management's input to be of great help in light of the latter's longstanding engagement in the analyses of, investment in and performance assessments for the company.

The Fund expects the company to make a large impact around the world by utilizing its implant method, a globally unique solution. Accordingly, we will extend long-term support to GIKEN through dialogue and engagement.

1

We have urged GIKEN to break away from dependence on the charismatic leadership of Founder Chairman and develop an organizational management approach commensurate with its standing as a global company. 2

We have recommended the publication of an integrated report as an effective means to organize the company's purpose, vision, value creation story, the social impact it aims to make and corporate governance initiatives undertaken, and to communicate these matters to all stakeholders, including shareholders, with the aim of facilitating a common understanding with them.



Establishing roadmaps for growth will be beneficial from a financial perspective and, to this end, we have encouraged GIKEN to disclose long-term targets for the composition of overseas sales to the stock market.

Progress in dialogue and engagement

GIKEN has notified us that, having refreshed its awareness regarding the necessity of information disclosure, the company formed a project team tasked with launching disclosure pursuant to recommendations from the Task Force on Climate-related Financial Disclosures (TCFD), issuing an integrated report and otherwise stepping up the dissemination of corporate information.

Although GIKEN held a financial results briefing for the first time at the close of the fiscal year ended August 2017 and has since disclosed only quarterly financial statements until recently, the company is now promoting management reforms at a faster pace than we expected. We consider its reform initiatives to demonstrate GIKEN's strong commitment to upgrading itself into a global company. We also engage in discussion regarding methods for calculating the outcome of its business activities with greater precision. We expect GIKEN's business expansion at home and abroad to gain further momentum after making progress in provisional calculations and other initiatives to assess the long-term disaster-prevention effects of the implant method, based on the number of disaster prevention-related construction projects and the value of funds used in such projects. Therefore, we will promote engagement with the company from a medium-term perspective.

Looking ahead, we will do our utmost to help GIKEN achieve growth and, to this end, we will not only assist this investee in the upgrading of its information disclosure practices but also support its pursuits in other aspects via constant, multifaceted dialogue and engagement.



Report on Investment Performance

Net Asset Value Trends (since Formulation to September 30, 2022)



Notes:

1. This graph represents net asset value per 10,000 units of investment after deducting administrative expenses (trust fees).

2. This graph merely shows the Fund's past track record and, therefore, is not intended to give any guarantee regarding future investment return.

Comments on asset management (from December 31, 2021 to September 30, 2022) and our future investment policy

Comments on asset management

Taking a strictly selective approach, the Fund strives to identify and invest in corporations that endeavor to bring global solutions to climate change-related issues from the perspective of mitigation or adaptation. We also expect our investees to create major impacts in terms of resolving these issues. To this end, we encourage them to consider combating climate change to be a major business opportunity that will enable them to achieve sustainable growth of corporate value.

During the period specified above, global equity market conditions were sluggish. Although there was profound progress in economic resumption and normalization after stagnation from the COVID-19 pandemic, steep inflation emerged due mainly to surges in demand on the back of prolonged supply shortages, a major issue already ongoing even before resumption. In response, interest rates were raised by central banks in many countries. This, in turn, led to plunges in equity prices, with the downgrading of high-growth corporations causing key equity indices to decline.

Investment return of the Fund during the period was negative. Looking at the status of our investees, Enphase Energy (a major manufacturer of microinverters for solar panels) and STEM (a renewable energy solution provider in the storage battery field) have seen growth in their equity prices as they both earned higher market ratings thanks to such positive factors as the adoption of U.S. bills aimed at countering inflation. Likewise, equity prices for Darling Ingredients (a biofuel producer) and Euglena (a developer of microalga-based solutions) increased on the back of energy price surges. However, Ansys (a major simulation software company), Coupa Software (a major software provider assisting in corporate purchasing activities) and other high-growth corporations suffered from major declines in equity prices as their valuations were revised due to rising interest rates. In the latter half of the period, equity prices for ITM Power (a manufacturer of green hydrogen production equipment) similarly declined significantly. While we still expect ITM Power to continuously contribute to the popularization of green hydrogen and thereby achieve substantial improvement in corporate performance, we have decided to significantly reduce investment weighting allocated to this company during the period. This was attributable to our projection that progress in its initiatives to create impacts and achieve growth in business results will be slower than previously estimated. Our investment actions during the period include the new inclusion of STEM in addition to weighting adjustment.

-Future investment policy-

In terms of financial performance trends among investees, businesses aimed at creating impacts performed steadily, contributing to overall robustness. They have also made steady progress in creating impacts thus far, with our future outlook for their endeavors being similarly favorable.

Taking a look at the global economy, the environment surrounding the equity market has been radically evolving due mainly to a growing sense of uncertainty on the back of steep inflation and ever-higher policy interest rates. Although we believe that corporations capable of creating a major impact in term of resolving climate change-related issues are highly likely to overcome changes described above over the medium to long term, we will stay vigilant and flexibly align our approach to the future impact of economic recessions on corporate performance, tail risks arising from the excessive tightening of monetary policies and rapidly looming geopolitical risks, and other factors.

Quantitative summary of impacts created by investees in fiscal 2021

Volume of GHG emissions reduced via investees' contributions	33,750,000 t-CO2e
Volume of water resource consumption reduced	34 billion liters
Improvement in farmers' profit	¥94 billion*

Value of the disaster-prevention effect realized by and the improved productivity of construction work

¥574 billion

* Based on an exchange rate of US\$1 to ¥140.

Provisional calculation of outcomes realized by investees, their contribution to the creation of impacts, and the degree of their contribution to the Fund's investment performance (from December 31, 2021 to September 30, 2022)

Name of investees	Areas in which they operate	KPIs for outcomes ^{*1}	Provisional measurement of outcomes*1 (fiscal 2021)	Contribution to positive impacts* ²	The degree of contribution ^{*3} to investment performance
GE	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	18,780	18,780	-0.4%
ITM Power	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	20	20	-2.9%
MSCI	Adaptation	Reductions in the volume of GHG emissions and other contributions by the investees (1,000 t-CO2e)	Qualitative measurement only	-	-0.3%
QD Laser	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	Qualitative measurement only	-	-0.1%
SSAB	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	Qualitative measurement only	-	0.2%
Agilyx	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	Qualitative measurement only	-	-0.3%
Ansys	Adaptation	Reductions in the volume of GHG emissions and other contributions by the investees (1,000 t-CO2e)	Qualitative measurement only	-	-1.6%
Eastman Chemical	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	Qualitative measurement only	-	-1.0%
Weyerhaeuser	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	35,000	3,000	0.0%
Ecolab	Adaptation	Volume of water resource consumption reduced (billion liters)	814	34	-0.4%
Enphase Energy	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	7,200	7,200	3.3%
Autodesk	Adaptation	Value of the disaster-prevention effect realized by and the improved productivity of construction work (billion yen)	Qualitative measurement only	-	-0.3%
GIKEN	Adaptation	Value of the disaster-prevention effect realized by and the improved productivity of construction work (billion yen)	574	574	-1.7%
Ginkgo Bioworks	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	Qualitative measurement only	-	-0.4%
Xylem	Adaptation	Volume of water resource consumption reduced (billion liters)	1,520	-	0.1%
Zaptec	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	Qualitative measurement only	-	-1.3%
Genus	Mitigation Adaptation	Improvement in farmers' profit (million US\$)	1,280 671	1,280 671	-2.6%
Xinyi Glass	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	1,980	1,980	-0.5%
STEM	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	310	310	1.0%
Darling Ingredients	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	3,200	690	2.0%
Desert Control	Adaptation	Improvement in farmers' profit (million US\$)	Qualitative measurement only	-	-0.2%
Novozymes	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	Qualitative measurement only	-	-0.4%
Befesa	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	30	3.7	-1.5%
Ball	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	Qualitative measurement only	-	-1.6%
Mercari	Mitigation	Volume of GHG emissions reduced (1,000 t-CO2e)	480	480	-2.1%
Euglena	Mitigation Adaptation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e) Estimated number of people who experienced improvement in health conditions	0.3 Qualitative measurement only	0 —	1.3%
Li-Cycle	Mitigation	Volume of GHG emissions reduced by the investees' contributions (1,000 t-CO2e)	10	8.5	-0.6%

*1 Social effects of corporate activities

*2 A portion of an outcome deemed to contribute to year-on-year improvement of key goal indicators (KGIs) associated with climate change-related issues. In general, it indicates the year-on-year growth portion of the outcome delivered by each investee.

*3 Numerical evaluation of the impact arising from changes in each equity price on fluctuations in the net asset value during the period

Definitions of impact and framework for impact measurement

Our definitions of impact

Impact refers to changes arising from the outcome (benefits) of business activities (e.g., products, services, technologies and business models) relative to their effects on people and the environment.

Resona Asset Management will remain keenly aware of its investees' intentions regarding the creation of impacts and monitor the status of their initiatives to this end along with results of such

initiatives. Our methods for measuring impact are, however, under development, and therefore it is difficult to quantitatively measure all aspects of impact. Taking this difficulty into account, we have prepared this Impact Report to enhance the transparency of quantitative and qualitative information being disclosed regarding what contribution our investees have made in terms of creating impact.

Our methods for impact measurement

In reference to a framework* proposed by the Impact Management Project (IMP), a global initiative for impact investment, our impact measurement uses the following methods. *The IMP has defined changes in outcomes in terms of their effects on people or the planet as impact and proposes five dimensions of impact measurement and 15 essential indicators for the assessment of impact performance.

Five dimensions of impact measurement

What is the intended impact?	 Whether the organization undertakes business activity that significantly contributes to the mitigation of or adaptation to climate change If the intended impact is the mitigation of climate change, whether the technology, product, service or business model in question contributes to the realization of the target under the Paris Agreement If the intended impact is adaptation to climate change, whether the technology, product, service or business model in question contributes to the practical reduction of current risks or risks that will arise in the future from climate change's negative impact on economic activities
Who is the intended beneficiary?	Whether benefits arising from the organization's products and services are properly delivered to stakeholders who need them
How much impact?	Whether the organization uses trustworthy methods to measure the outcome of its activities relative to its environmental and social impact as well as benefits to be delivered via its products and services to intended stakeholders
What contribution is made?	Whether the business that contributes to the mitigation of or adaptation to climate change is positioned by the organization as its key operation
What risks are there?	Whether the organization recognizes and strives to counter issues hampering the creation of the intended outcome

Source: Compiled by Resona Asset Management in reference to the official website of the IMP

Investment standards used by the Fund to select equities

	Standards	Details	
Intention	Intention and additionality	Whether the creation of impact is incorporated into and consistent with the investee's management vision, policies and business strategies; in addition, whether the business that contributes to the mitigation of or adaptation to climate change is backed by the investee's mainstay operations or core competencies Whether the management of the investee is capable of exercising robust leadership and supervision to realize the creation of the intended impact	
Finance	Financial return	Whether the business aimed at creating impact contributes to financial return for the investee at present as well as in the future	
Impact	Contribution to the mitigation or adaptation to climate change	 Whether the investee undertakes a business activity that significantly contributes to the mitigation of or adaptation to climate change If the intended impact is the mitigation of climate change, whether the technology, product, service or business model in question contributes to the realization of, or transition to, a net-zero society (or the achievement of targets of the Paris Agreement) or meets best possible standards as a transitional technological solution and is consistent with roadmaps for transition to net zero emissions If the intended impact is adaptation to climate change, whether the technology, product, service or business model in question contributes to the practical reduction of current risks or risks that will arise in the future from climate change's negative impact on economic activities If the investee's own business operations involve a large volume of GHG emissions, whether said investee plans or implements such initiatives as setting reduction targets consistent with the Paris Agreement 	
	Beneficiaries of impact	Whether benefits arising from the investee's products and services are properly delivered to stakeholders who need them (whether beneficiaries include such underprivileged stakeholders as the vulnerable)	
	Effectiveness of impact	Whether the investee uses trustworthy methods to measure the outcome of its activities relative to its environmental and social impact as well as benefits to be delivered via its products and services to intended stakeholders (for example, the use of well-recognized measurement standards in impact reporting)	
	Risks	Whether the investee recognizes and strives to counter issues hampering the creation of the intended outcome	
ESG	Due diligence	Whether the investee is considered to be adequate in light of results of ESG due diligence undertaken by Resona Asset Management in connection with material environmental and social issues said investee is striving to address	



Appendix



Perspective from the demand side





*1 Virtual Power Plant

- *2 Systems designed to convert or control electric energy
- *3 Factory Automation: Devices designed to collect, manage and control various data from the factory

*4 Factory Energy Management System

- *5 (Net) Zero Energy House: A type of housing that produces a greater amount of energy than its own energy consumption
- *6 (Net) Zero Energy Building: A type of building that produces a greater amount of energy than its own energy consumption



Appendix

Impact Measurement Management (IMM) Process Employed by Impact Funds

IMM refers to a management cycle aimed at realizing the intention of an impact fund.

It mainly consists of target setting for the intended impact, strategy formulation, the determination of measurement

indicators and target values, and the management of impact performance.

IMM process	Investment and IMM team	Review by department specializing in ESG	
Confirmation of consistency with selection criteria for impact investment	 Confirm whether the investee's business and intention are in conformity with the Fund's impact targets Develop a logic model to identify the intended outcome of the investee's activities Assess whether the intended impact can be created on an ongoing basis 	Whether the new investment candidate meets multifaceted aspects of the selection criteria determined by the impact fund Whether the new investment candidate is equipped with countermeasures against negative impacts or ESG risks	
Develop a framework for the measurement of impact to be created by individual corporations	 Develop methods for quantitative impact measurement Assess the necessity of corporate information disclosure relative to impact measurement 		
Dialogue and engagement with investee corporations	 Assess and secure a common understanding of issues that should be addressed to create impact, confirm measures to resolve such issues, and encourage the investee to put these measures into practice Work in collaboration with the investee to increase the sophistication of impact measurement 	Whether the framework for impact measurement and results of measurement are appropriate	
Measurement of impact created by investee corporations	 Measure social impact (quantitative and qualitative aspects) Have a dialogue with the investee regarding the appropriateness of impact measurement 		
Measurement of impact arising from the Fund's portfolio as a whole	 Measure social impact arising from the portfolio Identify issues that should be addressed to better realize the Fund's intentions 	Whether action taken by the investment team based on impact measurement is appropriate	
Execute necessary action	 Decide on new inclusion or divestment Formulate plans for engagement with investees confronting issues Take a top-down approach to improve the logic model based on results of action 	Ĩ	



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Details of the Fund

To apply for the shipment of the Investment Trust Explanation Document (Prospectus) or the purchase of the Company's products, please contact sales agencies that handle the Fund's investment trusts as listed on the following website.

https://www.resona-am.co.jp/fund/120027/sales.html (Japanese only)

Features of the Fund

- 1 Through the RM Global Impact Investment Mother Fund (Climate Change), the Company invests in equities listed in financial instrument exchanges or registered in over-the-counter (OTC) markets in developed countries, including Japan, as well as in emerging nations (including those scheduled for listing or registration).
- 2 Taking a strictly selective approach, the Company identifies and invests in corporations that strive to help mitigate or adapt to climate change—a global social problem—through their business and are expected to achieve sustainable growth of corporate value even as they create a positive social impact via these endeavors.
- 3 The Company strives to maintain ongoing engagement (dialogue) with investee corporations to aid them in the enhancement of their corporate value and the creation of social impact. Through this engagement, the Company also conducts the quantitative and qualitative measurement of the status of social impacts being created.
 - Basically, the Company does not undertake foreign exchange hedging for foreign currencydenominated assets included in its portfolio.

Investment Risks

While the net asset value of the Fund can be affected by fluctuations in the value of securities, etc., included in its portfolio, gains and losses arising from the management of trust assets are attributable to investors.

Accordingly, the Company gives no guarantees regarding principals contributed by investors. Please note that investors may suffer damage due to a decline in standard unit value or a loss of principal. Investment trusts are thus different from deposits or savings.

Fluctuations in the Fund's standard unit value may be induced by various risk factors, especially those listed below. Therefore, readers are advised to be aware of and consider risks associated with the Fund before investing in its products and make prudent judgments.

◆Market risks (equity price fluctuation risks, REIT price fluctuation risks and foreign exchange fluctuation risks) ◆Credit risks ◆Liquidity risks ◆Country risks

The Fund aims to maintain its portfolio with 20 to 50 equities. Fluctuations in prices of a given equity held by the Fund may significantly affect its standard unit value.

Note: Factors leading to fluctuations in standard unit value are not limited to those listed above. For more details, please refer to the Investment Trust Explanation Document (Prospectus).

Fund Expenses

Expenses to be borne directly by customers

At the time of purchase	Fees required at the time of purchase	This is determined by multiplying the total amount of purchase prices by the following rates.It will be calculated based on commission fee rates (up to 3.0% before tax and 3.3% after tax) stipulated by each sales agency. For more details, please contact the Company's sales agency.Fees required at the time of purchase consist of compensation for, and costs associated with, such administrative operations as the sale of the Company's products as well as explanations and information services regarding these products and the relevant investment environment.
At the time of exchange for cash	Amount withheld as part of trust assets	None.

Expenses to be borne indirectly by customers

Asset management expenses (trust fees)		This is determined by multiplying total net assets of the Fund by <u>the annual rate of 1.65% (1.5% before</u> <u>tax</u>). These expenses are being recorded on a daily basis throughout the fiscal period of the Fund.		
	Distribution of asset management expenses	Recipients	Distribution (before tax)	Main services
		Commissioning companies	Annual rate of 0.735%	Compensation for the administration of the Fund, relevant research, the calculation of standard unit value, the preparation of disclosure materials, etc.
		Sales agencies	Annual rate of 0.735%	Compensation for the shipping of investment reports and other documents to be delivered to customers, the administration of the Fund within bank accounts, the provision of post-sales information services, etc.
		Commissioned companies	Annual rate of 0.030%	Compensation for the administration of assets under management and the implementation of matters instructed by commissioning companies
		Note: Distributed expenses entail separate expenses equivalent to consumption taxes.		
	Other fees and expenses Other sees and expenses Other fees and expenses of administrative operations for trusts. The Fund bears these expenses their emergence (audit expenses are borne on a daily basis). All items named above include ex- equivalent to consumption taxes. As the amount of the aforementioned fees and expenses fluctu- step with changes in the status of trust asset management, the Company is not positioned to pr preliminary statement regarding fee rates, maximum amount, calculation methods or other details.		e audit expenses, commission fees associated with the sale and d via futures transactions and option transactions, expenses rency-denominated assets, taxes on trust assets, and expenses tive operations for trusts. The Fund bears these expenses upon ne on a daily basis). All items named above include expenses amount of the aforementioned fees and expenses fluctuates in sset management, the Company is not positioned to present a maximum amount, calculation methods or other details.	

Notes: 1. The prices of listed real estate investment trust (REIT) securities cannot be stated as they are determined by the demand-supply status of the market. 2. Preliminary statements regarding the total amount of fees and commissions, etc., named above cannot be presented in any form (maximum

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