[Contribution] Carbon Neutrality and Corporate Value

—MHI Group's Initiatives and Contributions—

MHI Group is addressing sustainability issues such as the realization of a carbon neutral society.
Professor Nobuyuki Isagawa of the Graduate School of Management, Kyoto University, who specializes in corporate finance, explained the significance of the Group's initiative based on the latest research on the relationship between companies' ESG indicators and financial performance.

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It is not an overstatement to say that avoiding the risk of climate change and maintaining the global environmental sustainability is the mission given to the current generation. In Japan, the government, industry and research institutes such as universities are ramping up a variety of initiatives aimed at the realization of Carbon Neutrality by 2050.

The notes to General Principle 2 of the Corporate Governance Code revised in FY2021 state the following: "... given that the Sustainable Development Goals (SDGs) were adopted at the United Nations Summit and the number of organizations supporting the recommendation of the FSB's Task Force on Climate-related Financial Disclosure (TCFD) has increased, there is a growing awareness that sustainability (mid- to long-term sustainability including ESG factors) is an important management issue from the perspective of increasing mid- to long-term corporate value. In light of this, it is important for Japanese companies to further promote positive and proactive responses to sustainability issues. The appropriate actions of companies based on the recognition of their stakeholder responsibilities will benefit the entire economy and society, which will in turn contribute to producing further benefits to companies, thereby creating a virtuous cycle."

MHI Group's carbon neutral initiatives are aligned with the approach of the Corporate Governance Code, and are beginning to produce actual results. For example, MHI REPORT 2021 has a special feature on "New Challenges Toward a carbon neutral Society" including a roadmap for carbon-free power generation fueled by hydrogen/ammonia. Validation and commercialization of carbon-free power generation fueled by hydrogen/ammonia, realization of a hydrogen solutions ecosystem and development of CO_2 capture technology are explained in an accessible way that can be understood even by me without an engineering background.

The President's Message in this MHI REPORT 2022 describes the passion to realize global Carbon Neutrality by reducing CO_2 emitted through products delivered by MHI Group to client companies. In the conversation with the CTO, the decarbonization technology and hydrogen-related technology of MHI Group underpinning the President's Message are explained in detail. Strength and confidence can be felt in the CTO's comments that the volume of CO_2 emitted by power plants worldwide can be reduced using power generation facilities that are a core product for MHI, aggregating technical capabilities.

Against the backdrop of the integration of ESG and management that is progressing in the business community, there are also movements to integrate the non-financial elements of ESG with companies' financial performance in corporate valuation and finance that are my areas of research. Due to the advances in disclosure

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of data by companies, it has become possible to statistically verify the connectivity of ESG factors and ESG ratings, which are regarded as non-financial information, with companies' financial performance. As it is still a new area, there is no consensus on many of the results, but it has been confirmed that ESG initiatives such as decarbonization may have a positive impact on financial indicators such as return on capital and cost of capital*[1]. Furthermore, investors have also indicated the possibility of positive evaluation of the issuance of green bonds.

Figure 1 shows the results of the empirical analysis performed by the Isagawa Laboratory at Kyoto University. Using data on Japanese companies from 2010, we conducted a detailed investigation of the relationship between changes in emissions of greenhouse gas (GHG) including CO_2 and the subsequent return on invested capital (ROIC). As can be seen in the figure, a reducing in GHG emissions increases subsequent ROIC (the sign of the coefficient is negative) and reduces the cost of shareholder's equity (the sign of the coefficient is positive). It can be seen that in recent years, Japanese companies have realized the improvement of financial performance and reduction of cost of capital by engaging in curbing of greenhouse gas emissions. Financial value creation is realized when the return on capital exceeds the cost of capital. It could be said that companies aggressively and actively reducing CO_2 and GHG emissions can achieve both climate change initiatives and improvement of financial corporate value.

*1 A recent paper, Gillan, S., Koch, A., and L. Starks (2021) Firms and social responsibility: A review of ESG and CSR research in corporate finance, *Journal of Corporate Finance* is comprehensively summarizing research on companies' ESG activities and financial performance. This paper indicates that risk indicators and cost of capital are lower in companies with a higher ESG rating, and return on capital and share price performance are higher in companies with a higher ESG rating.

Figure1: Relationship between Greenhouse Gas Emissions and Financial Performance

	Explained variables	
	Change in ROIC	Change in cost of shareholder's equity
Change in greenhouse gas emissions (tons per million yen in sales)	−0.015**	0.009**
Logarithm of total assets	−1.254**	−0.944*
Tobin's q	2.057**	−0.490**
Financial leverage	0.638**	1.312
Number of companies	646	662

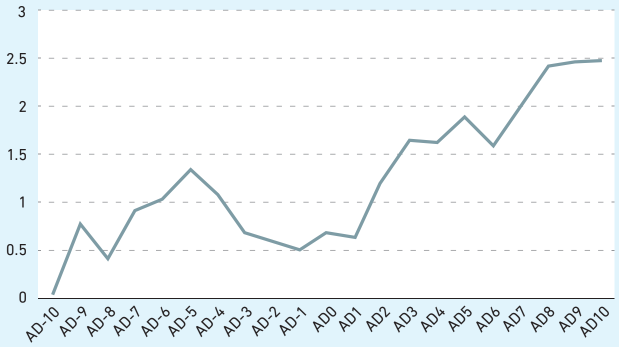
- The scope is companies listed on Section 1 of the Tokyo Stock Exchange between 2012 and 2020 from which data could be obtained. Greenhouse gases and cost of shareholder's equity was obtained from Bloomberg, and financial data was obtained from Nikkei Media Marketing's NEEDS-FinancialQUEST.
- The change in greenhouse gases is the change from year t-1 to year t. The changes in ROIC and cost of shareholder's equity is the change from year t-1 to year t+1.
- Fixed effect model of panel data analysis is applied. ** indicates a significance level of 1% and * indicates a significance level of 5%.

Investors also appreciate companies that take a proactive approach to Carbon Neutrality. Figure 2 shows movements in share prices (stock return) for the issuance of green bonds and SDG bonds. Research results are shown for the Japanese equity market in Panel A and for the global equity market in Panel B. It can be seen that share prices rose due to the issuance of green bonds and SDG bonds*[2].

Combining the results of Figure 1 and Figure 2 tells the following story. Funds raised through the issuance of green bonds and SDG bonds are invested in environmental projects and activities to resolve social issues, and produce the output of reduction of CO_2 and improvement of environmental factors (E factors). As shown by the results in Figure 1, reduction of CO_2 and improvement of E factors are expected to be linked to the outcome of improvement of financial corporate value through increased return on capital and reduced cost of capital. Equity markets that anticipate the future are believed to incorporate expectations of increase in corporate value in the form of higher share prices.

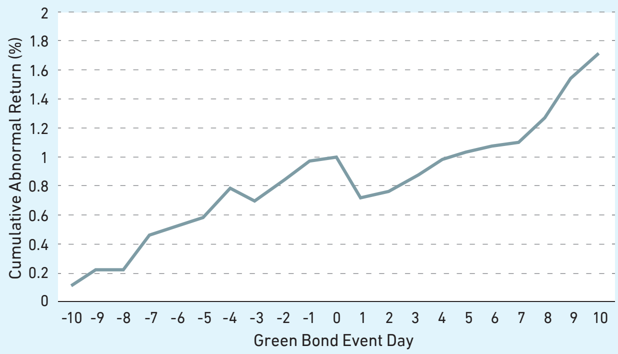
Figure 2: Equities Markets Evaluation of SDG Bond and Green Bond Issuance

(A) Research on Japan



- Using the date of announcement of the issuance of 42 SDG bonds issued by Japanese companies in the period from 2016 to 2020 as AD0, a standard method was used to calculate stock returns during the 10 days before and after that date.
- Stock returns were confirmed to be significantly positive.
- A rise in share price could not be confirmed for the issuance of bonds (straight bonds) other than SDG bonds during the same period.
- (Source) Excerpt from results of a study conducted by Isagawa Laboratory.

(B) Research on Europe and the U.S.



- Reaction of the share price of 132 companies that issued green bonds in global markets during the period from 2007 to 2017. Using the date of the announcement of issuance as 0 (Green Bond Event Day), a standard method was used to calculate stock returns (Cumulative Abnormal Return (%)) during the 10 days before and after that date.
- Stock returns were confirmed to be significantly positive.
- (Source) Tang, D., and Y. Zhang, 2020, Do shareholders benefit from green bonds? *Journal of Corporate Finance* 61.

MHI Group also issues green bonds, and has developed the Mitsubishi Heavy Industries, Ltd. Green/Transition Finance Framework. The serious stance of engaging in the improvement of corporate value aimed at 2030, 2040 and 2050 by integrating the Green/Transition Finance Framework into the carbon neutral strategy aggregating technical capabilities is clearer. As stated in the CFO Message in this MHI Report, investors' interest in ESG and sustainability is rising. The Company's share price is rising (as of July 2022), reflecting the recovery in financial indicators such as business profit margin and ROE, and expectations in the carbon neutral strategy.

To reiterate, MHI Group's business is firmly linked to the realization of Carbon Neutrality of client companies and society. Utilizing the technology and know-how historically accumulated by MHI Group to contribute to the reduction of CO_2 and GHG emissions from client companies will lead to progress toward Carbon Neutrality of society. Improvements in the E factors of client companies are linked to improvements in financial performance and corporate value of client companies. MHI Group's carbon neutral initiatives could truly be said to simultaneously benefit society, client companies and MHI Group itself. This is the best practice of "the appropriate actions of companies based on the recognition of their stakeholder responsibilities will benefit the entire economy and society, which will in turn contribute to producing further benefits to companies, thereby creating a virtuous cycle" as set forth in the Corporate Governance Code.

In addition to supporting MHI Group's management policy of "Shared Aspirations for a carbon neutral Future," I have great expectations of it as a person living on earth.

*2 Research results similar to those in Figure 2 can also be confirmed in Flammer, C., 2021, Corporate green bonds, *Journal of Financial Economics*. In addition, research by Flammer indicates that the share prices of companies that issue certified green bonds that have received third-party certification increase, but the share prices of companies that issue noncertified green bonds that have not received third-party certification do not increase. Based on these results, the importance of certification of green bonds and SDG bonds can be understood.