

Corporate Management Reforms in Pursuit of a Low-Carbon Society

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Discussions are already underway regarding the setting of mid- and long-term goals for climate change policy under an international framework after 2012 (after the first commitment period of the Kyoto Protocol). This means that we are approaching a time when the further strengthening of restrictions on CO₂ (carbon dioxide) emissions will change the factors that determine a company's competitive edge.

Accelerated moves are seen both in Japan and overseas in studying how to attain these mid- and long-term goals. In the fall of 2008, Japan, which had been lagging behind the US and Europe in their introduction or consideration of an emissions trading program, began full-scale activities toward drawing up specific laws and regulations, such as the trial implementation of an emissions trading scheme and studies on the introduction of environmental taxation.

The introduction of an emissions trading scheme will present many risks to a company. This is because there are concerns that the allocation of CO₂ emissions allowances might act as a hindrance to business operations, cause a company to lose its vitality and deprive it of its competitive edge. Each company must adopt measures that can best respond to these risks.

We are approaching a time in which reforms in corporate management are necessary toward achieving the goal of a low-carbon society (where economic growth is achieved with low CO₂ emissions). Specific measures as part of such reforms will include the transition to a low-carbon business model and integrated CO₂ management. Japanese companies are expected to take the lead in these moves toward a worldwide low-carbon society.

I Paradigm Shift Brought about by CO₂ Restrictions

Control of adverse changes in the climate is an issue that each country must grapple with under an international framework. From mid- and long-term perspectives, the further strengthening of restrictions on CO₂ (carbon dioxide) emissions will largely change the factors that determine a company's competitive edge.

1 Results of Agreements Reached at the Hokkaido Lake Toya Summit

At the Hokkaido Lake Toya Summit (the 34th G8 Summit, hereinafter the "Lake Toya Summit") held in July 2008, climate change policy was high on the agenda. Even though 2008 marks the start of the first commitment period (2008 – 2012) of the Kyoto Protocol, the focus of international discussions has already shifted to the creation of the post-Kyoto Protocol framework in and after 2013.

The major topics of discussions for setting post-Kyoto Protocol goals are: (1) imposing CO₂ reduction targets on developing countries that were not subject to such targets under the Kyoto Protocol and (2) sharing mid- and long-term global goals.

There is a considerable difference of opinion among developed and developing countries with respect to the issue of imposing CO₂ reduction targets on developing countries and the reaching of an agreement on this matter is expected to incur considerable negotiation. However, an agreement was reached for the latter issue of sharing long-term global goals by accepting Japan's proposal of "reducing global CO₂ emissions by half by 2050" (Figure 1).

It is extremely significant that an agreement was reached on the sharing of long-term global goals. While there are still a relatively large number of voices claiming that the increases in global temperature and abnormal weather events that have recently occurred are not the result of greenhouse gases emitted by human activity, the Lake Toya Summit saw the world's leaders make a political decision to pursue a course of greater restrictions on CO₂ emissions.

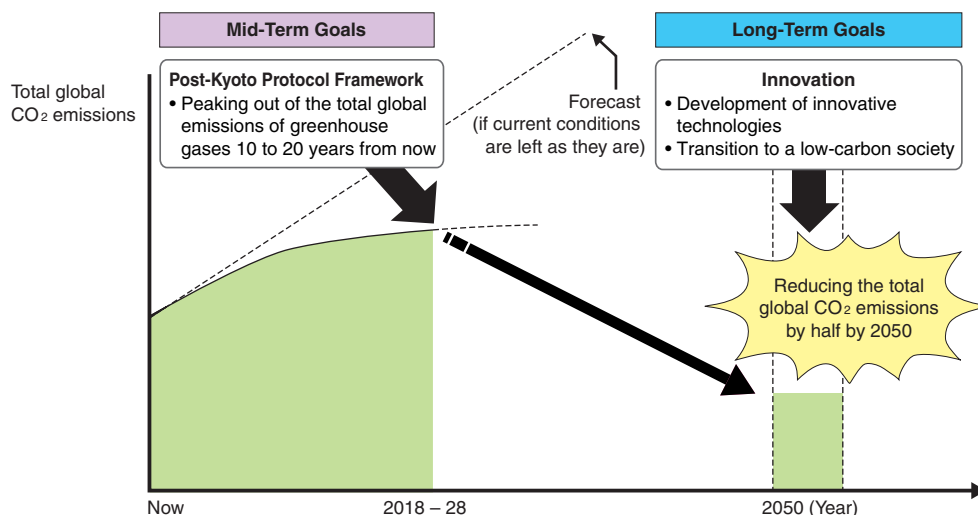
Equally significant was that the level of a CO₂ reduction target was set at the summit. The target of reducing CO₂ emissions by half by 2050 is extremely ambitious when we consider the measures that are already in place. It is clear that CO₂ emissions of major developing countries will continue to increase. Even if developed countries were to reduce their emissions to zero, global CO₂ emissions would remain at the current level (as estimated by the International Energy Authority (IEA)).

The achievement of this difficult goal will inevitably require the development of innovative technologies to reduce CO₂ emissions, as well as the efforts of people, companies and governments both in industrial activities and in household activities. In addition, for society as a whole to adopt systems that consider reducing CO₂ emissions, there is a need for the innovation of social systems including policies, institutional and legal frameworks.

2 Paradigm Shift to a Low-Carbon Society

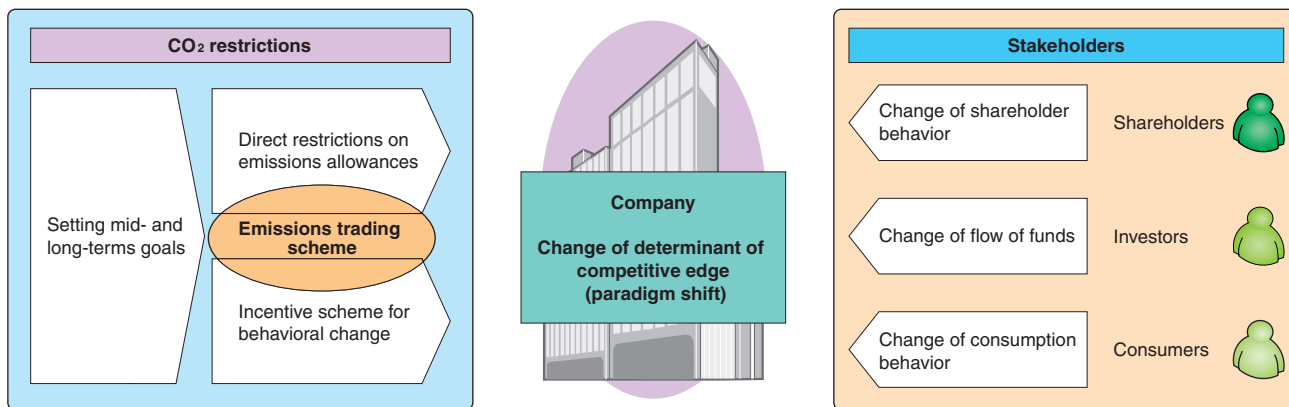
Under these moves, CO₂ reduction is becoming a new key factor for economic and social activities both in Japan and all over the world. For companies, this means that the time at which a determinant of the competitive edge largely changes is fast approaching (Figure 2).

Figure 1. Mid- and Long-Term Goals for Achieving a Low-Carbon Society



Note: A low-carbon society is a society where economic growth is achieved while CO₂ emissions are limited.
Source: "Aiming at Making Japan a Low-Carbon Society" (Fukuda Vision), June 9, 2008.

Figure 2. Paradigm Shift to a Low-Carbon Society



Given that mid- and long-term goals have been set, specific policies and systems for achieving these goals will be developed from now on. The Japanese industrial sector has so far managed to maintain emissions at the current level through activities based on the Voluntary Action Plan on the Environment established by the Japan Business Federation (Keidanren) (hereinafter referred to as the Keidanren Voluntary Action Plan). On top of these activities, the Japanese government has decided to introduce economic measures to reduce CO₂ emissions such as an emissions trading scheme and environmental taxation. There are, of course, concerns that these new schemes could impose additional costs and risks on companies.

The considerable coverage that the media gave the Lake Toya Summit has led to consumers, investors and shareholders becoming much more aware of the CO₂ emissions of companies and products. If a company is not seen as working to take measures to reduce CO₂ emissions in their business activities, and striving to select raw materials, develop products and establish business models that are geared to reducing CO₂ emissions, not only will that company's competitiveness be affected, but also its share price might fall, making it difficult to raise capital.

A company that fails to move quickly to reform itself by considering how to secure sustainable business operations in preparation for the upcoming shift to a low-carbon society (i.e., a society in which economic growth is attained while limiting CO₂ emissions) is likely to miss the opportunity for growth that such a new society will present.

II CO₂ Restrictions Become Stricter Both in Japan and Overseas

As described in Chapter I, while every signatory country is striving to promote CO₂ reduction measures to

achieve the goals of the first commitment period (2008 – 2012) of the Kyoto Protocol, at the same time, each country continues to discuss stricter CO₂ restrictions to be imposed after 2012 under the post-Kyoto Protocol framework. The impact on each industry and company will vary depending on the particulars of the restrictions. Accordingly, every company must remain fully aware of the trends in CO₂ emission reduction. In particular, those companies that do much of their business overseas should pay close attention to the trends in those countries.

The following sections describe an emissions trading scheme that is attracting increased attention worldwide as the mechanism to drive the development and spread of emission reduction technologies.

1 Emissions Trading Schemes in Europe

A pioneer case of an emissions trading scheme is the European Union Emission Trading Scheme (EU-ETS). Because for Europe, a CO₂ reduction target was set as that for the entire European Union (EU) (rather than individual European countries) under the Kyoto Protocol, the EU introduced this scheme as a means of reducing overall emissions across the region (Table 1 and Figure 3).

The first phase (2005 – 2007) was a trial stage of the scheme. During this phase, it became clear that because generous emission allowances were given, total emission allowances were greater than the amounts actually emitted. As a result, around April 2006, the trading price sharply declined, ultimately falling to zero.

The second phase (2008 – 2012) corresponds to the first commitment period of the Kyoto Protocol, for which stricter caps were set and are being implemented on a full-scale basis.

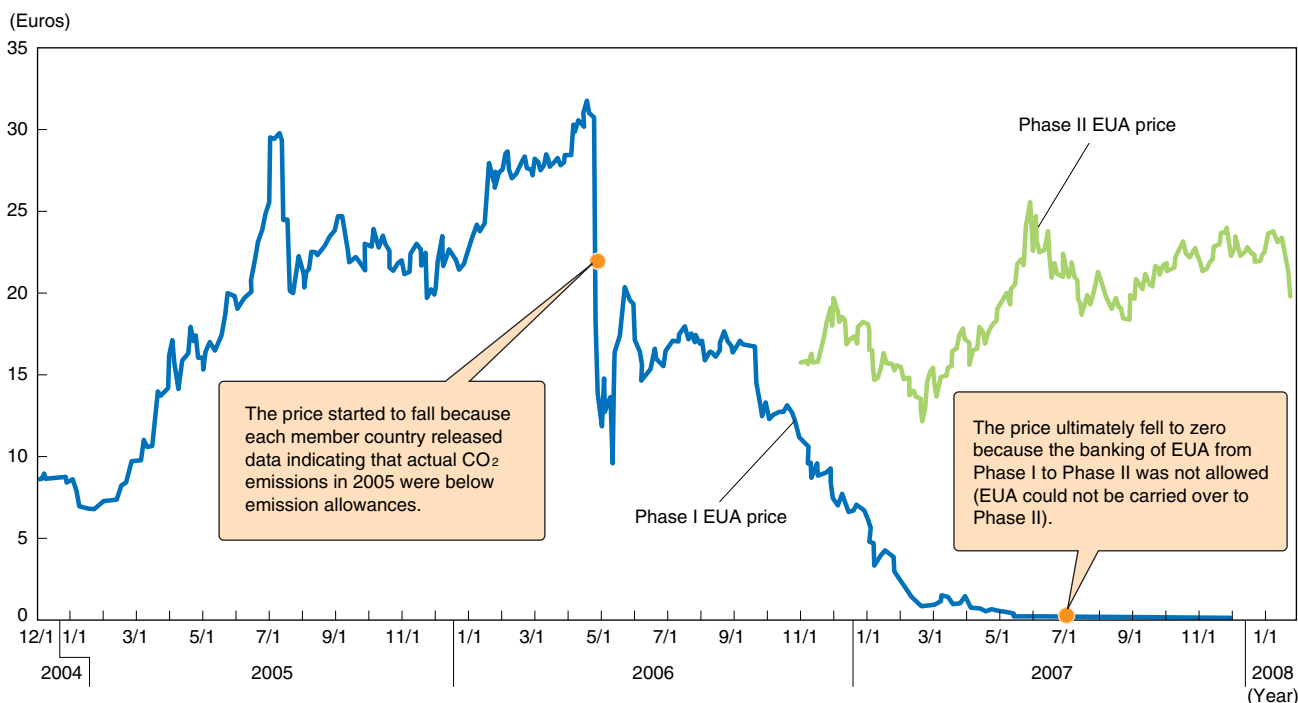
A plan for the third phase (2013 – 2020) has already been proposed. In Europe, it is expected that the prices of allowances indicated under the emissions trading scheme will lead to greater investments in the development of relevant technologies. The aim behind

Table 1. European Union Emission Trading Scheme (EU-ETS)

	Phase I (2005 – 2007)	Phase II (2008 – 2012)	Phase III (2013 – 2020)
Positioning	Trial period	Full-scale implementation	Activities under the post-Kyoto Protocol framework
Allowances	+ 8.3% (relative to 2005 levels)	- 5.7% (relative to 2005 levels)	Annual reductions of 1.74% from the second phase average (- 21% relative to 2005 levels by 2020)
Coverage	Energy conversion sector, industrial sector	Planned expansion to aviation (after 2011)	Addition of petrochemical, ammonia, aluminum
Allocation method	Free allocation: At least 95%	Free allocation: At least 90%	Increase of auction ratio • 60% auction in 2013, with the ratio subsequently increasing • From 2013, 100% auction for the power generation sector

Note: Free allocation means that emission allowances are set with no costs incurred, while an auction system refers to paying the auction price to acquire emission allowances.

Figure 3. Price Trend of EU Allowance (EUA)



Notes: EUA refers to emission allowances allocated under the EU-ETS.
 Source: Compiled based on material published by the Ministry of Economy, Trade and Industry.

announcing the third phase plan is that the emissions trading market can be maintained in the future and a price would accrue for CO₂.

The emissions trading market is already on the way toward being established, with the volume of trading in 2007 reaching 2.061 billion t-CO₂ (where emissions of CO₂ and other greenhouse gases are measured in carbon dioxide equivalents and expressed in tons), which corresponds to a value of \$50.097 billion. Up until the second phase, there were freely allocated emission allowances. However, in the third phase plan, an expansion of the auction ratio is proposed, which is expected to lead to the expansion of the size of the emissions trading market.

2 Emissions Trading Schemes in the US

In the United States, both the federal and some state governments are leaning towards the introduction of an emissions trading scheme, although the Bush administration declined to join the Kyoto Protocol (Table 2).

At the federal level, the Senate first addressed an emissions trading scheme in June 2008 when the Lieberman-Warner Bill was debated, though this bill was defeated. However, Democrat and President-elect Barak Obama has declared his support for an emissions trading scheme. It is therefore expected that a full-scale study on the introduction of emissions trading might begin in and after 2009.

Table 2. Trends in Emissions Trading Programs in the US

Introduction of Emissions Trading Programs			
Program	Participants	Overview	History
Lieberman-Warner Bill	Nationwide	Targets: Coal-burning facilities, natural gas/oil production facilities and imports, etc. Goals: 70% reduction relative to 2005 levels by 2050	<ul style="list-style-type: none"> December 2007: Approved by Senate Committee on Environment and Public Works June 2008: Withdrawn as a result of deliberations in a plenary session of the Senate
Regional Greenhouse Gas Initiative (RGGI)	Ten northeastern states	Targets: Power plants Goals: Between 2009 and 2014, stabilize CO ₂ emissions by an increase of 4% relative to 2000 – 2004 levels, with a reduction of 10% by 2018	<ul style="list-style-type: none"> First auction held in September 2008 Scheduled to start in January 2009
Western Climate Initiative (WCI)	Seven western states and four Canadian provinces	Targets: Multiple sectors Goals: 15% reduction relative to 2005 levels by 2020	<ul style="list-style-type: none"> Draft program announced in May 2008 Basic requirements of the program to be set by December 2008

President-elect's Stance

	Emissions reduction goals	Emissions trading
Barak Obama (Democrat)	80% reduction relative to 1990 levels by 2050	Supporting the cap and trade approach whereby 100% of emissions allowances are allotted by auction.

Note: "Cap and Trade" refers to a program in which allowances of greenhouse gas emissions are set for each target, and excesses or deficiencies of each target can be adjusted through trading.

Source: Compiled based on various published materials.

At the state level, the Regional Greenhouse Gas Initiative (RGGI) is being promoted by ten northeastern states while the Western Climate Initiative (WCI) is being promoted by seven western states and four Canadian provinces.

The RGGI program is applied to power plants; it will go into effect in January 2009. This program requires power generation companies to purchase their allowances by means of auctions. The first auction was held in September 2008, where the entire allocation of allowances worth 12.56 million tons was sold. The allowances were sold for \$3.07 per ton, which yielded about \$39 million to the states that issued them.

In contrast, the WCI program is widely targeted at multiple sectors such as power plants, large-scale industrial activities and commercial facilities. The goal of this coalition is to reduce CO₂ emissions by 15 percent by 2020 as compared to 2005 levels. This program was proposed in May 2008 and is to begin operation in 2012.

3 Emissions Trading Schemes in Japan

Despite repeated discussions by the Ministry of the Environment, the Ministry of Economy, Trade and Industry and other concerned agencies, they have yet to settle on an emissions trading scheme for introduction in Japan. Nevertheless, a political decision was made in the so-called Fukuda Vision, "Aiming at Making Japan a Low-Carbon Society," which was announced a month before then Prime Minister Fukuda hosted the Lake

Toya Summit, and a trial scheme commenced in the fall of 2008. Based on this framework, the specific post-Kyoto Protocol terms and conditions in and after 2013 will be discussed and stricter levels of CO₂ restrictions will be established in Japan in the future. Therefore, it is vital to take note of these moves.

There are several reasons why opinions in Japan are divided on the introduction of emissions trading.

The foremost reason for opposing the introduction of emissions trading stems from the fact that Japanese industry has experienced and overcome two oil crises, and is equipped with the world's highest level of energy efficiency. Because of the implementation of the CO₂ reduction measures based on the Keidanren Voluntary Action Plan, the industry has essentially held its CO₂ emissions at 1990 levels in pursuit of achieving the goals of the Kyoto Protocol.

Furthermore, there is concern that the international competitiveness of Japanese industry would be compromised. Given that competition is now global, if allowances are set on Japanese companies, the costs incurred for implementing CO₂ reduction measures would place Japanese companies at a disadvantage as compared to those in developing countries for which no emissions allowances have been set.

In addition, some people are doubtful about the effects of promoting investments for the development and spread of the technology needed to attain reductions in CO₂ emissions, which are the expected results of emissions trading.

For the time being, companies voluntarily participate in a trial emissions trading program. Whether it is appropriate to introduce such a program on a mandatory basis in the future will be determined only after the effectiveness of the program is verified. In any case, the program will be introduced by adjusting the design of the program so that agreement can be reached.

The Japanese government is actively making proposals in order to take the lead in international post-Kyoto Protocol negotiations in an attempt to ensure that the targets to be adopted are not disadvantageous to Japanese industry as were those under the Kyoto Protocol. In order for the government to make its proposals persuasive and based on international considerations in which the government wants to show to the world its forward-looking domestic policies and schemes, it is highly likely that the introduction of an emissions trading scheme will be based on a political decision.

From the perspective of companies, rather than using a uniform method of calculation for setting CO₂ reduction targets, setting targets flexibly according to the circumstances particular to each company or each industry will make any such program easier to accept. The Keidanren Voluntary Action Plan has already been shown to function as a practical emissions restriction scheme. By assuming that actual emissions might exceed allowances, some companies are drawing on the Clean Development Mechanism (CDM) to secure credits (a type of allowance).

In addition to a trial emissions trading scheme, a domestic CDM program also commenced in the fall of 2008. This domestic CDM program is designed to promote a reduction in emissions from companies (small- and medium-sized companies), transportation and households, on which no limitations have been imposed under the Keidanren Voluntary Action Plan.

If companies participating in the Keidanren Voluntary Action Plan support those small- and medium-sized companies that do not have access to either the necessary technology or capital and are successful in reducing their greenhouse gas emissions, the efforts made by the supporting companies are regarded as contributions toward emissions reduction and can be used as credits in achieving the goals set under the trial emissions trading scheme. Moreover, a study is being made in a field that has come to be known as “product CDM” where if a manufacturer is successful in disseminating highly energy-efficient products, the greenhouse gas reductions estimated to be achieved by such products are regarded as being part of the reductions achieved by such manufacturer.

The above-mentioned Fukuda Vision also indicated that as the mid-term goal, the country-specific emissions target for Japan would be announced in fiscal 2009. As such, discussions have already started on the introduction of a series of laws needed for these purposes. Depending on the contents, this legislation will affect

companies differently. Companies must take a proactive stance towards the establishment of these laws by offering specific opinions about this legislation and participating in related discussions.

III Risks to Companies Associated with CO₂ Restrictions

The introduction of an emissions trading scheme is expected to entail four major risks for corporate management. Management must be aware of those risks.

The first risk is the restrictions imposed on business operations. Under an emissions trading scheme, CO₂ allowances are allotted to respective companies. This means that the amount of energy that a company can consume is limited, hindering the expansion of business operations.

In the case of the manufacturing industry, for instance, even if a factory possesses the necessary CO₂ allowances according to its production plan, it will suffer a lost opportunity if production cannot be stepped up when sales of a product are good. Moreover, the amount of CO₂ emissions is influenced by factors such as the composition of the products to be manufactured, capacity utilization and the weather in the area around the factory, which makes it difficult to forecast the actual amount of CO₂ emissions or adjust such emissions. Consequently, there will be situations where production volume must be limited in order to suppress CO₂ emissions, while there will be other cases where it will be necessary to purchase further CO₂ allowances.

The second risk is the fluctuation in the price of CO₂ allowances. Any company that has exceeded its CO₂ allowances must seek to purchase a surplus allowance from a company whose emissions are within its allowances. However, because the price of allowances is likely to change according to the balance of supply and demand at the time, any company that buys or sells their allowances will be subject to the risk of price fluctuation.

Furthermore, in the case of a scheme where emissions allowances are allotted free of charge, companies that are buying additional emissions allowances (or selling surplus allowances) are only subject to a risk of price fluctuation. If, however, an auction system that is expected to become the mainstream type of emissions trading is adopted, a company must procure all of the emissions allowances that it needs, making it necessary for the company to endure both the cost burden and the risk of price fluctuations. In addition, there is also a fear that speculative fund trading that is said to be one of the factors for rising crude oil prices might lead to significant fluctuations in the value of emissions allowances.

Third, there is a risk of the non-fulfillment of transactions. If CO₂ emission restrictions are imposed on companies from which a company procures materials or to which a company delivers products, the possibility of the non-fulfillment of transactions can arise because companies supplying materials and companies accepting deliveries are also subject to those same risks of limited business operations and/or price fluctuations.

If, for example, the supplier of the materials for a company's products has exceeded its CO₂ allowances, it will not be able to attain the needed level of production, which may affect the stable procurement of materials. Conversely, if customers have exceeded their CO₂ emission allowances, they may reduce the amounts of their orders. These situations are likely to affect a company's production planning and measures for controlling CO₂ emissions.

The fourth and final point relates to the risk of a company becoming less competitive. The major reason for such lowered competitiveness is that the costs that each company incurs to implement measures to control CO₂ emissions will vary considerably depending on the design of the emissions trading scheme established.

A major turning point is whether a company becomes subject to an emissions trading scheme. As stated in Chapter II, if a company that competes globally becomes subject to the domestic emissions trading scheme, it is likely to see its global competitiveness compromised, especially when compared to that of companies in the countries where CO₂ restrictions are lax. Similarly, the fact that not all companies are subject to the scheme affects the competitiveness of respective companies even in their home market.

Also, when emissions allowances are allotted free of charge, the cost burden imposed on a company will vary depending on the success of the emissions reduction measures it has implemented in the past. If the size of a company's emissions allowance allocation is based on its previous emissions, those companies that have strived to develop means of conserving energy since well before the period subject to calculation will face a much stricter allocation than those that have done nothing to reduce their emissions. This leads to an illogical situation where the cost of reducing CO₂ emissions becomes even higher under such a stricter allocation.

In addition, the CO₂ emissions of a company are also related to business characteristics such as the manufacturing processes involved, the factory location and the sales territory. Accordingly, the design of a scheme will affect a company's competitiveness.

While four major risks are discussed in this section, the degree of the risks associated with an emissions trading scheme will vary greatly depending on the design of the scheme. Therefore, it is important for each company to examine the risks that an emissions trading scheme will entail, and to determine how best to handle those risks.

IV Corporate Management Reforms in Pursuit of a Low-Carbon Society

Companies have long been striving to reduce their CO₂ emissions primarily through efforts to reduce their energy consumption. However, when considering the CO₂ reduction targets set from the mid- and long-term perspectives, there is a limit on how much these efforts for improvement can achieve. To realize major reductions in CO₂ emissions, it will be necessary to revolutionize not only individual technologies, but also a company's management. Companies must implement CO₂ management that is necessary as a part of corporate management in a low-carbon society, and must address the following five topics.

- 1) Keeping abreast of CO₂-related trends
- 2) Transition to a low-carbon business model
- 3) CO₂ management for products
- 4) Publicizing CO₂ strategy
- 5) Integrated CO₂ management

1 Keeping Abreast of CO₂-Related Trends

With the ultimate goal of cutting the world's CO₂ emissions in half by 2050, CO₂-related legal and regulatory systems, preferential treatment, support measures, technological developments and corporate activities will always be changing according to the situation at the time. To successfully steer corporate management among these moves, it is essential, first of all, to keep abreast of the trends related to CO₂.

(1) CO₂ regulations that extend along the supply chain

Companies must do their utmost to understand the trends related to CO₂ regulations that are applied to not only their own companies, but also to every company in the supply chain.

While the nations of the world are working towards the establishment of a common post-Kyoto Protocol framework, the national governments are in a position where they must develop their own CO₂ restrictions in order to attain their own goals. Therefore, CO₂ restrictions will differ between countries and the risks arising from these regulations will differ between companies. Let's consider, for instance, a case in which a company aims to avoid the non-fulfillment risk described in Chapter III. In selecting overseas companies as suppliers, one of the factors that a company must take into account would be the CO₂ regulations applied in the country where such suppliers are located.

Moreover, close attention must be paid to industrial policies in each country. Because the design of a CO₂ restriction scheme is often based on a government's

industrial policies, the government may limit the industries to be developed and strengthened if overall emissions allowances throughout the world are reduced. In such a case, any industries that are not covered by the government's promotion policy are likely to find themselves subject to even stricter regulations.

To sustain business operations under such a situation, companies must do whatever they can to avoid CO₂ risks including those that are identified throughout the supply chain such as selecting partners that are well aligned with the CO₂ regulations and/or propping up those that are lagging behind.

(2) Preferential treatment and support measures for CO₂ reduction

In efforts to reduce CO₂ emissions, while institutional moves are being made as to the establishment of restrictions on CO₂ emissions and the bearing of associated costs, there are also moves to provide preferential treatment and support measures. Accordingly, it is important to keep abreast of these moves and use such measures as opportunities for growth.

1) Preferential treatment for "eco products"

More and more importance is being placed on product development and marketing based on each country's programs of preferential treatment for environmentally friendly products (eco products).

One of the effective means of promoting environmental protection measures in homes, offices and transportation is the popularization of eco products. In Japan, programs of preferential treatment to help popularize eco products include displaying the "Eco Mark" and labels stating that the product achieves a certain ratio of the energy-saving standard, and providing preferential tax rates for eco products. Chiefly through Europe taking the lead in the regulations for environmental protection, such programs of preferential treatment are beginning to spring up all over the world.

For example, in 2005, the EU published the EU Directive on Energy-using Products. This directive requires that the products be designed to a certain standard and carry labels indicating such. Currently, the EU is determining the maximum amount of power that a product can consume in standby mode. Furthermore, while such a system has not yet been adopted, there is a move to seek a reduction of value-added taxes on eco products.

Given the rise in crude oil prices in recent years, much more emphasis has been placed on energy-efficient products from the perspective of energy conservation. Consequently, the moves of each country need to be watched carefully.

2) Capital support program for the transfer of environmental technology

As a means of transferring leading edge environmental technology from advanced to developing countries,

various capital support programs have been presented. It is necessary to examine whether any such programs could be used.

Developing countries cannot be said to have an excellent record in terms of the environment because they are often plagued with air and water pollution. On top of that situation, these countries will inevitably be required to reduce their CO₂ emissions in the future. Business partners in the developing countries must themselves contend with environmental and CO₂-related measures. However, due to a lack of technology and funds, they find it difficult to attain satisfactory results. Japanese industry, with its highly advanced environmental technology, is expected to provide both technical and financial support.

As one example towards achieving this goal, Japan, Europe and the US are promoting the creation of the Climate Investment Funds (CIF) to support developing countries in their projects to prevent climate change. The World Bank administers and manages these funds, and provides funding and financing to the developing countries. Japan is scheduled to contribute a maximum of \$1.2 billion to the CIF. With the expected participation of additional countries including China and India, the CIF expects to grow to something on the order of \$10 billion.

As further independent measures, Japan has announced yen loans to support projects related to climate change. In order to support developing countries that are working on the prevention of climate change, in January 2008, Japan set up a new program under which yen loans are provided at less than half the interest rate of conventional development aid. Up to around ¥500 billion will be lent over five years starting in 2008.

The use of a capital support program can be a highly effective means of promoting CO₂ reduction along the entire supply chain, which was discussed in Item (1). Keeping aware of the means available will be one of the extremely important issues in addressing the reduction of CO₂ emissions.

(3) Understanding trends in other companies

While keeping a close eye on the trends of other companies related to CO₂ reduction measures and eco products, companies must implement the development and marketing of eco products, and must make efforts to provide information on these activities to respective governments.

A positive approach taken by a company to CO₂ reduction measures and eco products will lead to improving its brand as being that of an ecology-conscious company. The government of each country needs to know about technology and products in order to disseminate CO₂ reduction measures and eco products. By regarding this situation as an opportunity, some companies are publicizing their ecology-oriented activities in marketing their products and improving their brands.

For example, Panasonic (formerly Matsushita Electric Industrial Co., Ltd.) held the Matsushita Group China Environmental Forum 2007 in Beijing in September 2007. During the forum in which local government agencies also participated, Panasonic announced its Declaration of Becoming an Environmentally Contributing Company in China. One item in the product strategy of this declaration was that all new products to be introduced in China would be certified as Green Products (eco products) as defined by the group. Through these activities, Panasonic has strongly presented an environmentally conscious approach to local government agencies.

From now on, more laws and regulations for reducing CO₂ emissions will be enacted, and competition among companies in terms of their environmentally friendly approaches will intensify. Accordingly, it will be vital for a company to move ahead of other companies in promoting marketing efforts and in establishing a dialog with the government.

(4) Understanding technological trends

Every country in the world is making concentrated efforts in developing technologies for reducing CO₂ emissions. In implementing measures to reduce CO₂ emissions, it is important to not only draw on existing technologies but also to be aware of the trends in technology from the mid- and long-term perspectives.

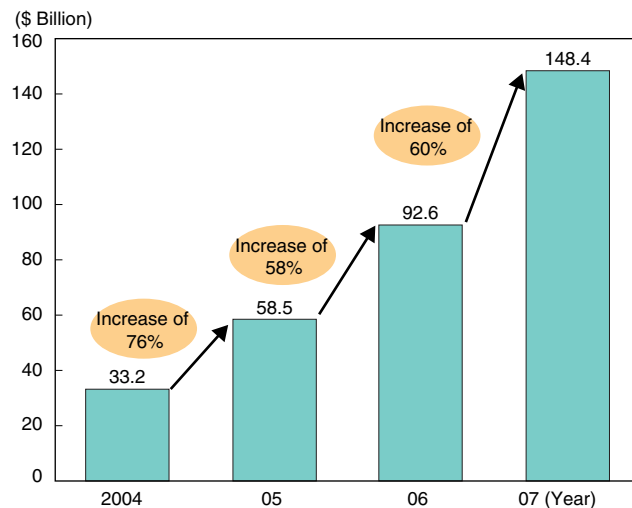
In view of the long-term goal of reducing global CO₂ emissions by half by 2050, energy innovation will be indispensable. In fact, considerable funds are already flowing into the introduction of so-called “clean energy” with low CO₂ emissions and the development of next-generation technologies. These increased investments are thought to be triggered by the fact that the long-term direction of CO₂ regulations has been made known.

Investments in clean energy are sharply increasing at the rate of more than 50 percent every year. In 2007, the size of such investments had reached \$148.4 billion (Figure 4). The first on the list of major technologies in which investments are being made is solar power, followed by biomass fuels and wind power. Other investment targets include energy-efficient technologies, battery technologies and carbon capture and storage (CCS) technologies.

According to Clean-Energy Trends 2008 published by Clean Edge, a US research firm, the global market for clean energy including solar power, biomass fuels, wind power and fuel cells has already reached \$77 billion (a 40% increase over the preceding year). By 2017, it is forecast that the market will grow to \$255 billion, about 3.3 times its size in 2007.

Rapid progress is being made in the development of clean energy, with cost effectiveness of CO₂ reduction improving along with such development. While measures to reduce CO₂ emissions must be implemented as quickly as possible, from the mid- and long-term

Figure 4. Global Trends in Investment in Clean Energy



Source: Compiled based on material published by New Energy Finance.

perspectives there is an option of giving expectation to the emergence of next-generation technologies that offer excellent CO₂ reduction effects in overall terms, together with extremely good cost performance.

2 Transition to a Low-Carbon Business Model

What must not be forgotten in a low-carbon society is that all human activities are likely to be subject to restrictions on CO₂ emissions. Accordingly, the establishment of a low-carbon business model whereby CO₂ emissions are limited throughout the life cycle of a product (all steps from the mining of raw materials through to the ultimate disposal of the product) is essential to attain sustainable business operations.

With reference to the cases of companies that have been addressing rapidly increasing fuel and resource costs in recent years, the following sections discuss the three directions that a low-carbon business model must take.

(1) Measures to deal with CO₂ restrictions imposed on partners

It is not possible for a company to operate a business in a vacuum. Instead, it must establish relationships with partners and retailers, and work with many different entities in order to accomplish business activities. To avoid the risks associated with conforming to CO₂ regulations throughout a product's life cycle, it is important to rebuild its existing business structure to include partners, retailers and any other transacting parties.

One approach toward this end is the strengthening of cooperation with partners and/or the promotion of vertical integration. If it is not possible to align with a leading partner that is well positioned to endure the CO₂ restrictions, the materials procurement risk could emerge as a matter of concern. A strategy that ensures stable procurement would involve deeper cooperation by

establishing business partnerships and/or entering into long-term contracts. Other options would include the implementation of vertical integration based on capital tie-ups.

While this is not an example of a low-carbon business model, such an approach can be seen in the expected global rush to construct nuclear power generating facilities.

Securing a supply of uranium fuel is obviously vital to the success of any nuclear power generation business. For this purpose, Toshiba has secured uranium mining rights in cooperation with Kazatomprom, a resource company that is run by the government of Kazakhstan. Hitachi, together with GE (General Electric), has established a tie-up for a uranium enrichment business with Cameco, a Canadian company that is one of the world's largest publicly traded uranium companies. Moreover, Mitsubishi, jointly with Cameco, has purchased development rights and interest in a uranium mine from Australia's Rio Tinto.

As a strategy for avoiding the business risks associated with CO₂ restrictions, reviewing the relationships with partners must be taken into consideration as a necessary option.

(2) Measures to deal with CO₂ restrictions imposed on a company's business activities

As to a company's own business activities, in addition to considering how to reduce CO₂ emissions from a production and product point of view, a company must also review geographical locations and logistics.

To reduce the CO₂ emissions associated with the distribution of products, the locations of factories and partners must be reviewed, as well as distribution routes so as to minimize the distance that products travel.

Given the increasing globalization of business these days, each process including production, distribution and sales involves the transport of parts, components and products all over the world. Thus, the amount of CO₂ emissions related to logistics cannot be ignored. The movement of products can be minimized by producing goods as close as possible to the region where they are consumed. For instance, the production to consumption cycle can occur within each of Asia, Europe and North and South America. Of course, in view of the current trend toward the global division of labor, establishing an end-to-end business structure within a given area will not be easy. Nevertheless, it is one possibility that should be considered if a low-carbon business model were to be established.

Another important issue is the construction of shared distribution platforms.

The improvement of distribution efficiency is an issue that logistics companies must always keep in mind. Accordingly, some companies have already embarked on joint distribution as a means of reducing costs. More than ever before, there is a need for joint distribution

with other companies in the same industry in order to optimize the entire distribution process, thereby contributing to a low-carbon society. In this case, it would also be necessary to separate the business aspects where competition takes place in the same industry from those where efforts to reduce CO₂ emissions are made through joint distribution.

While measures to reduce CO₂ emissions have so far constituted only one element when considering location and distribution, these two factors will become two of the most important issues in the worldwide trends toward stricter CO₂ restrictions and in establishing a low-carbon business model.

(3) Responses to changes in consumer behavior

As we move toward a low-carbon society, consumers will also have to review their lifestyles, which will lead to changes in their behavior under a variety of CO₂ restrictions. In response to these changes, companies must strive to propose a low-carbon business model that is tailored to the needs of consumers who are themselves attempting to reduce their carbon emissions.

One way of achieving this goal would be to switch from being a vendor of products to being a provider of functions (services).

Rental and sharing schemes that have been in place for some time can reduce the required amounts of materials and products, thus lessening the emission of CO₂ by the amount that would otherwise have been emitted in producing those goods. In addition, if a new product with superior energy efficiency is developed, consumers will be relatively quick to switch to such a product, which may reduce CO₂ emissions at a stage earlier than expected.

Recently, car-sharing schemes have started to become popular, especially among young people who do not want to be burdened with the high costs of owning an automobile, as well as those people and companies that balk at high fuel costs. This change in the sense of values can be effectively utilized to develop rental and sharing schemes as part of a business model for reducing CO₂ emissions.

Other measures would include the collection and recycling of products that have reached the ends of their useful lives.

While such activities were originally positioned as part of a mechanism for recycling materials, if discarded products were collected and their parts or the products themselves are reused, CO₂ emissions could be reduced by the amount that would have been emitted in the manufacture of replacement products.

Actually, because the costs incurred to collect and recycle discarded products are considerable, it is not easy for collection and recycling businesses to generate a profit. With a rise in the cost of fuels and resources, however, reconsidering the profitability of collection and recycling merits attention.

An advantage of these measures for companies is that they can maintain their contact with consumers, which

provides an opportunity for follow-up marketing. To effectively utilize such an advantage, companies are expected to realize a sustainable low-carbon business model, while meeting consumers' low-carbon needs.

3 CO₂ Management for Products

To ensure sustainable business operations, a company must establish an underlying scheme that enables it to monitor the amount of CO₂ that a product emits during its life cycle.

Currently, the Ministry of Economy, Trade and Industry is taking the initiative in developing a carbon footprint system that is expected to provide a means of managing CO₂ emissions.

In this system, the amount of CO₂ that a product emits over its lifetime is calculated, and a label indicating the calculated amount is attached to the product. If the amount of CO₂ that is emitted in each process of materials procurement, manufacture, retail sales and so on is shown, it would be much easier to develop measures to minimize the amount of CO₂ emitted. However, because energy costs can be estimated based on the amount of CO₂ emissions, it is not easy to persuade the transacting partners with whom a company negotiates prices to provide the amounts of their CO₂ emissions. Nevertheless, if this system is implemented on a mandatory basis, the platform needed to collect the amount of CO₂ emissions is expected to be in place (Figure 5).

Furthermore, the carbon footprint system is expected to satisfy the needs of consumers who want to know the CO₂ emissions information of a product. The consumer can make a selection based on the displayed CO₂ emissions for the product, while companies can apply the system to carbon offset products.

The idea behind carbon offset is to (1) try to minimize the generation of greenhouse gases such as CO₂, (2) estimate the amount of greenhouse gases that are nevertheless emitted and (3) offset such emissions by investing in

activities to reduce the amount of greenhouse gases that correspond to the emitted amount. Most companies are already working on the development of offset products that are attractive to consumers. The offset products that are developed from the perspective of fulfilling corporate social responsibility (CSR) include those to which emissions allowances are attached and those for which the amount of CO₂ to be emitted when a product is used is offset by emission allowances (Table 3).

In order to understand the situation surrounding a company's business and products in terms of CO₂ emissions and identify the problems presented by such a situation that must be resolved, and to meet the needs of consumers for products with lower CO₂ emissions, it is important for a company to undertake CO₂ management for its products.

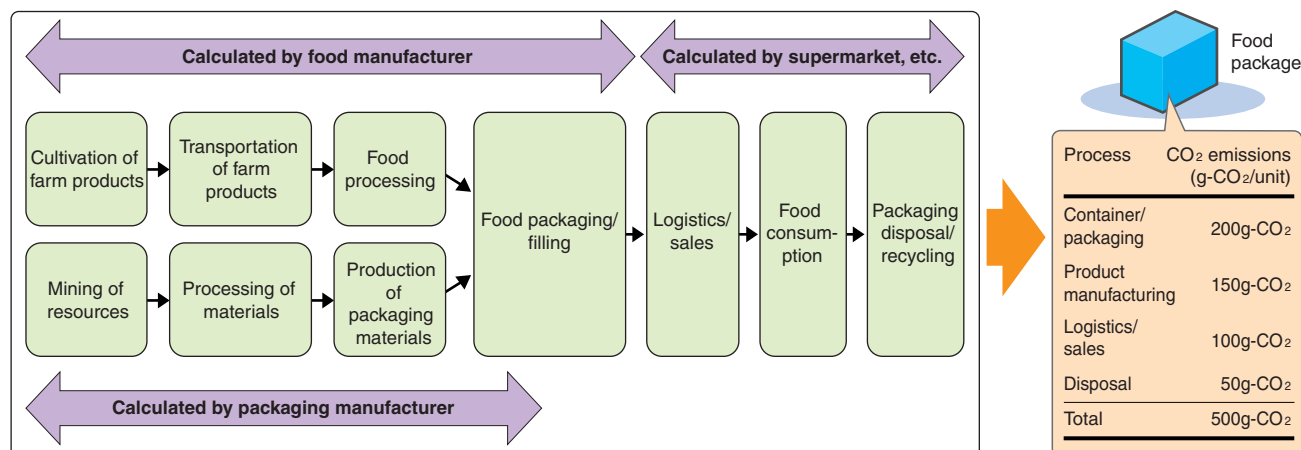
4 Publicizing the CO₂ Strategy

Because CO₂ regulations have become stricter and constitute sources of risk, shareholders and investors have become more aware of a company's CO₂ strategy. Therefore, it is very important for companies to publicize their CO₂ strategies.

As moves of investors and shareholders in relation to the CO₂ strategies of companies, increased attention is being paid to the Carbon Disclosure Project (CDP) and shareholder proposals.

The Carbon Disclosure Project has surveyed the world's leading corporations (about 2,000 companies) regarding the risks related to climate change, business opportunities and their CO₂ strategies, and has listed the 50 companies that rank highest in terms of information disclosure in its Carbon Disclosure Leadership Index. This project operates in cooperation with the world's leading investors and financial institutions. In 2007, the number of participating investors reached 385 with total assets under management amounting to \$57 trillion (Figure 6).

Figure 5. Overview of Carbon Footprint Labeling (Processed Food)



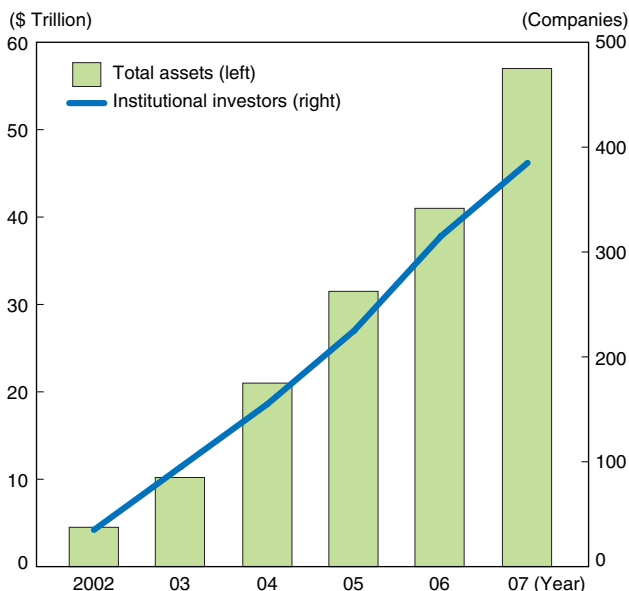
Note: g-CO₂: Emissions of greenhouse gases are measured in carbon dioxide equivalents and expressed in grams.

Table 3. Examples of Carbon Offset Products

Company	Carbon offset product	Overview
Japan Post	Carbon offset New Year's greeting cards	<ul style="list-style-type: none"> • Sold for ¥55 (including a ¥5 contribution). • Contribution is used to purchase CDM credits (one type of emissions allowance). • An equivalent amount is donated to environmental organizations, etc.
Nissan Motor	March Collette (automobile model) with carbon offset	<ul style="list-style-type: none"> • For each March Collette sold, CO₂ allowances worth one ton are acquired, which is reported to the Japanese government. • The purchased allowances correspond to the amount of CO₂ emitted by driving about 8,000 km.
Lawson	Participation in a CO ₂ offset program in exchange for points	<ul style="list-style-type: none"> • Points, or cash, can be used to buy credits in an Argentine wind power project. • Customers receive a certificate for the transfer of credits to the government account.
Nippon Travel Agency	Travel products with carbon offsets	<ul style="list-style-type: none"> • The amount of emissions generated by taking a journey is based on the means of transportation used. • The purchaser selects and pays for an offset. • A certificate guaranteeing transfer of the purchased credits to the government account, which is called a Carbon PASS, is issued to the purchaser.

Source: Compiled based on various published materials.

Figure 6. Caron Disclosure Project (CDP): Participating Investors and Total Assets under Management



Source: Compiled based on the Caron Disclosure Project Report 2003 – 2008.

A report published in the US notes that the number of shareholder proposals emphasizing the issue of climate change has been increasing year by year. Many such proposals stress the obligations of companies to report to shareholders on policies, planned targets and specific measures for preventing climate change. Among these proposals, some even go so far as to indicate specific measures such as “there is a need to switch to renewable energy.”

Such increased interests on the part of shareholders and investors in the issue of global warming also suggest that the issue of climate change can no longer be ignored in planning business strategies.

While companies have been making efforts to publicize their CO₂ control measures through means such as environmental reports, there is still not enough information being disclosed on the CO₂ risks facing companies,

business opportunities and other related matters. In the future, a company must actively strive to make its CO₂ strategy known outside the company as part of its public relations activities.

5 Integrated CO₂ Management

For corporate management, CO₂ has already become an important issue. In the future, the relationship between management and CO₂ seems set to become wider ranging and much more important. Rather than just being a part of environmental management, a CO₂ strategy is directly related to a company’s business strategy, which requires that the company strengthen its CO₂ management on an integrated basis.

To date, it has been sufficient for a company to be aware of the progress of its CO₂ emissions through its environmental management and to adopt measures in order for it to attain its own targets. However, when emissions targets are imposed on a company, the company must continually be aware of the current state and prospects of its production and sales activities and must apply highly cost-effective measures including the option of purchasing emissions allowances in order to attain the imposed targets, while keeping the costs of such measures to a minimum.

From the perspective of business operations, the business structure itself constitutes one of the preconditions that determine the amount of CO₂ emissions. If any change occurs in the location of factories, partners or sales areas, the amount of CO₂ emissions will change even if the production levels remain constant, depending on available energy sources, the climate and/or distribution distances. Therefore, it is vital for a company to consider CO₂ emissions before making any decisions on its business structure.

Furthermore, to achieve sustainable business operations, it is important to maximize the cost effectiveness of CO₂ control measures from an overall perspective by optimizing such measures throughout the company

and/or throughout the entire supply chain. The CO₂ control measures that can be adopted and the effect of those measures vary depending on each company. In addition, the technologies related to CO₂ control measures are advancing rapidly and the costs for such measures are changing, as are the prices of emissions allowances. To achieve total optimization, a company must always be monitoring its business operations from the viewpoint of reducing CO₂ emissions.

In particular, when the overall business structure of a company, its affiliates and partners extends over more than one country, or when a company is engaged in multiple, different businesses, carbon matters become increasingly complex, leading to a much greater need for integrated CO₂ management.

In order to attain corporate management geared to a low-carbon society, a company structure capable of implementing integrated CO₂ management, including the points raised in the proposals described in Sections 1 to 4 of this chapter, is absolutely necessary. The development of a system that enables the collection and sharing of CO₂-related information is also important, as well as the establishment of planning functions covering all CO₂-related work in each department, its progress management and ensuring company-wide compliance. The

appointment of a chief carbon officer (CCO) is one way of meeting this need.

In any future world economy, CO₂ control measures will be a vital factor that largely influences the sustainability of a company. We have reached the point when the methods of corporate management must be reviewed so that CO₂ control measures can be optimally implemented.

At the same time, we can say that the CO₂ reduction technologies developed by Japanese companies have much to contribute to the reduction of CO₂ emissions around the world, and many Japanese corporations are among the world's leading companies in terms of carbon-conscious business operations.

While the transition to a low-carbon society is a challenge facing the entire world, Japanese companies should present a model of sustainable business operations by drawing on their world's highest levels of technologies and, at the same time, should benefit from the opportunities for growth in a low-carbon society.

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