

JFE Group's TCFD Report 2019

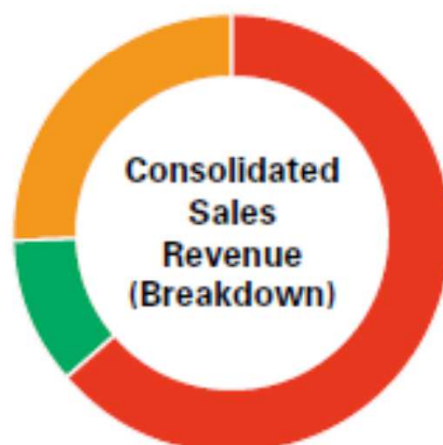
~ Risks and Opportunities ~

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Corporate Profile (as of March 31, 2019)

Company Name	JFE Holdings, Inc.
Head Office	2-2-3 Uchisaiwaicho, Chiyoda-ku, Tokyo 100-0011, Japan
Established	September 27, 2002
Capital	147.1 billion yen
Employees (consolidated)	62,083
URL	www.jfe-holdings.co.jp/en/



3,873.6 billion yen

- Steel Business
63.7% (2,830.6 billion yen)
- Engineering Business
10.9% (485.8 billion yen)
- Trading Business
25.4% (1,125.8 billion yen)



JFE Group
CSR REPORT 2019

TCFD Scenario Analysis ① - 2°C/4°C Scenarios



On May 27, 2019, JFE Holdings announced its endorsement for TCFD Scenario Analysis Based on IEA's SDS, 2DS, NPS, RTS

Scenario Analysis

The JFE Group will disclose information on how it will address climate change risks and opportunities in accordance with TCFD recommendations, including scenario analysis.

On May 27, 2019, JFE Holdings announced its endorsement for the final report of the Task Force on Climate-related Financial Disclosures (TCFD).

*The TCFD was established by the Financial Stability Board (FSB) at the request of G20 finance ministers and central bank governors.



Disclosure Consistent with TCFD Recommendations

TCFD Recommendations

Climate-related risks and opportunities will significantly impact medium- to long-term corporate finance. To reduce the risk of instability in the financial market, the G20 called on the FSB to establish the TCFD.

The TCFD considers disclosure methodologies that can be used to appropriately assess climate-related risks and opportunities and releases its findings as a

final recommendations report.

It is important for investors to accurately understand the financial impact of climate-related risks and the opportunities of investee companies when they make financial decisions. In this context, the task force recommends disclosures to be made in four core elements of organizational management: governance, strategy, risk management, and metrics and targets.

	Overview of TCFD Recommendations	JFE Holdings Disclosure (Corresponding Sections in this CSR Report)	Pages in CSR Report 2019
Governance	a. Describe the board's oversight of climate-related risks and opportunities	Corporate Governance System Outline	19-21
	b. Describe management's role in assessing and managing climate-related risks and opportunities	Risk Management System	21
Strategy	a. Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term	Results of scenario analysis	28-29
	b. Describe the impact of climate-related risks and opportunities on the organization's business, strategy, and financial planning	Results of scenario analysis	29-32
	c. Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario	Results of scenario analysis	29-32
Risk Management	a. Describe the organization's processes for identifying climate-related risks		
	b. Describe the organization's processes for managing climate-related risks	Risk Management System, Framework for Environmental Management	20, 33
	c. Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organization's overall risk management		
Metrics & Targets	a. Describe the metrics used by the organization to manage climate-related risks and opportunities in line with management process	KPIs for Material CSR Issues	15-18
	b. Disclose Scope 1 and 2 and, if appropriate, Scope 3 greenhouse gas (GHG) emissions and related risks	CO ₂ Emissions of the JFE Group/ Greenhouse Gas Emissions in the Value Chain	30
	c. Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets	KPIs for Material CSR Issues	15-18

Scenario Analysis

Scenario analysis is performed to provide an accurate understanding of climate-related risks and opportunities and assess implications to the current business strategy, thereby enabling the organization to establish business strategies that reflect this assessment. We selected the following two scenarios by considering the fact that our

business has potentially high exposure to the impacts of climate change.

Both scenarios are based on those developed by the International Energy Agency (IEA). Analysis is conducted under the assumption that a uniform carbon price is implemented in major emitting countries toward the realization of the 2°C target.

Selected scenario	2°C Scenario	4°C Scenario
Reference Scenario	Transition scenario developed by the IEA • Sustainable Development Scenario (SDS)* ¹ • 2°C Scenario (2DS)* ¹	Transition scenario developed by the IEA • New Policies Scenario (NPS)* ¹ • Reference Technology Scenario (RTS)* ¹
Physical Risks	Climate change projection scenario developed by the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathways (RCP) Scenario* ²	Climate change projection scenario developed by the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathways (RCP) Scenario* ²
How Society will Look	Dynamic policies will be adopted and technical innovations will progress to limit the average temperature rise by the end of this century to 2°C and realize sustainable development. Assume a society in which our business is affected by social changes accompanying transition to a decarbonized society. • World-wide/industry-wide uniform carbon pricing* ³ • Increase in the rate of sales of electric vehicles to overall vehicle sales	Despite new policies implemented in each country based on approaches under the Paris Agreement, average temperature rises about 4°C by the end of this century. Assume a society in which our business is affected by temperature rise and other climate change. • Increase in the occurrence of flooding • Sea level rise

*1 Source: IEA "World Energy Outlook 2018" *2 Source: IEA "Energy Technology Perspectives 2017" *3 Source: IPCC Fifth Assessment Report

*4 If price of carbon differ from country to country, there is a risk in international trade. In this analysis, we assume that carbon price is uniform across all countries. If price of carbon is introduced, it is expected that carbon price will be implemented in developed countries and some developing countries. By taking the into account, we formulated the 2°C scenario based on the assumption that a uniform carbon pricing is introduced to major emitting countries to push forward achieving the target of two degrees.

Scope of Business and Period for Analysis

This analysis covers the following businesses: the steel business by JFE Steel, the engineering business by JFE Engineering, the trading business by JFE Shoji Trade, and businesses carried out by some of the other Group companies. The period covered is up to 2050.

Relevance with JISF's Long-term Vision for Climate Change Mitigation

While JISF's Long-term Vision for Climate Change Mitigation represents the industry's challenge toward realizing zero-carbon steel with an eye on 2100, the period covered by our scenario analysis is up to 2050. The reason for this is it will enable us to ensure resiliency in our Group's business strategy at the mid-point of the long-term challenge.

Process to Identify Key Factors that Impact the Business

Process to Identify Key Factors for Material Risks and Opportunities

Step 1: Examine the entire value chain from a holistic perspective and sort out factors that impact the businesses under analysis.
Step 2: Examine all factors from a holistic perspective and identify key factors by taking into consideration the level of impact and stakeholder expectations and concerns.

	2°C Scenario	4°C Scenario
Impact on Procurement		③ Unstable new materials procurement due to increased occurrence of climatic hazards
Impact on Direct Operation	① Decarbonization of iron and steelmaking process ② Increased needs for effective utilization of steel scrap	③ Damage to production bases and offices caused by climatic hazards
Impact on Product and Service Demand	④ Change in demand for automotive steel, etc. ⑤ Increase in demand for solutions to promote decarbonization	④ National resilience

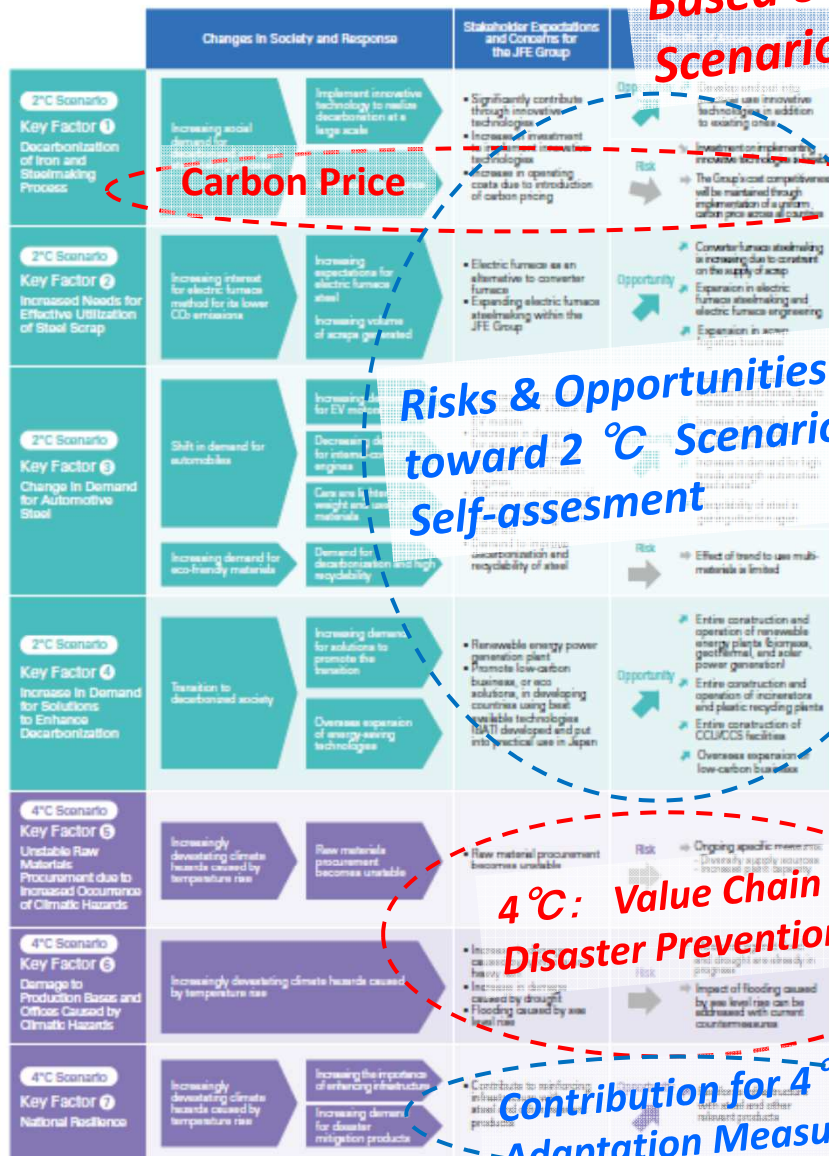
Level of impact Expectations and concerns of stakeholders Key factors are identified

Axis for identifying key factors: ● Level of impact (possibility of risks and opportunities arising) Level of impact if it manifests) ● Expectations and concerns of stakeholders

TCFD Scenario Analysis ② - Risk/Opportunity Assessment



Results of Scenario Analysis



Based on IES's 2°C Scenario Assumptions

Overview of Scenario Analysis Assessment

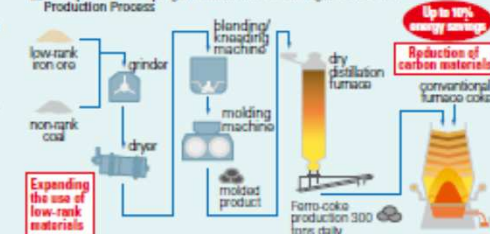
Factor ① Decarbonization of Iron and Steelmaking Process

we are developing innovative technologies to emerge as the pioneer in realizing a decarbonized society. With a strong financial base to invest in innovative technologies, we are significantly contributing to the transition to a decarbonized society.

Selected Stories: Examples of Measures: R&D & Innovations

JFE Steel has been committed to decarbonization since 1990. We are increasing the efficiency of the iron and steelmaking process by introducing innovative technologies and expanding the use of electric furnaces. In addition, we are developing innovative iron-making processes such as COURSE50 and COURSE100 to reduce CO₂ emissions through hydrogen reduction and CCS. COURSE50 is a technology for reducing CO₂ emissions by about 10% and 20%, respectively, through each technology. The first facility is expected to come online by 2030, followed by the implementation of other plants. COURSE100 is a technology for reducing CO₂ emissions by about 50% through the use of iron ore put into blast furnaces. In addition, we are developing a hydrogen reduction iron-making technology which we will aim to put into practice in the future.

Example of Developing an Innovative Technology: Ferro-coke Production Process



Cost competitiveness will be maintained through a uniform carbon price across all countries.

If a uniform carbon pricing is introduced to major emitting countries, the increase in operating cost will be reflected reasonably on the price of steel products both in Japan and overseas, thus maintaining the Company's cost competitiveness. In addition, since CO₂ emissions per unit of steel production is the lowest of all competing materials, steel retains its superior position in cost competitiveness.

Carbon Price

FOCUS Key Factor ② Increased Need for Effective Utilization of Steel Scrap

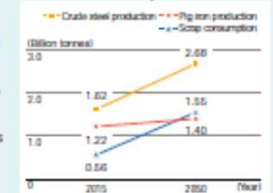
While the use of steel scrap increases, demand for crude steel will also rise over the long-term. This will result in an increase for pig iron production by blast furnace (converter steel). Furthermore, the entire JFE Group will benefit from opportunities arising from the expanded use of electric furnaces, and it will utilize the construction technology of electric furnaces while expanding the scrap logistics business.

Steel scrap, a raw material for electric furnace steel, is used efficiently, as it is almost completely recovered in the steel value chain. For society, which expects the realization of the under 2°C scenario, steel is utilized as a basic material that will help achieve the SDGs. Steel accumulation will increase as well as the amount of scrap used. Global steel demand is expected to grow alongside the overall growth in the population and economy, and production of pig iron (converter furnace steel) is also expected to rise to support the development of a sustainable society (JISF: Long-term Vision for Climate Change Mitigation). In addition, under the current technology, the quantity of high-grade steel materials is only feasible using converter furnace steel. This steel and electric furnace steel will co-exist and be used in applicable places.

The JFE Group is viewing the increase in demand for electric furnace steel as well as the world-wide increase in the amount of scrap generated as an opportunity, and it will enhance its electric furnace steel production while applying its engineering technology for constructing an entirely cutting-edge, energy-saving electric furnace facility with the ultimate goal of opening up other business opportunities. Moreover, the Group will advance the development of technologies to utilize scrap and increase the industry-wide use of this material.

Meanwhile, expanding the use of scrap will bring about an increase in logistics for distributing it, and this will provide an opportunity for JFE Shoji Trade to expand its logistics business.

Estimated Supply and Demand for Steel Production and Scrap Use



TCFD Scenario Analysis ③ - Selected Stories & KSFs

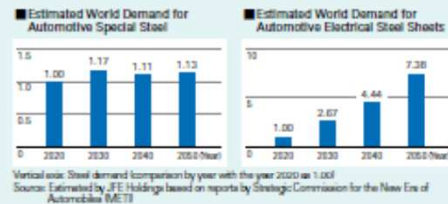


FOCUS Key Factor ① Change in Demand for Automotive Steel

Product contribution toward 2°C Scenario

Increased demand for electrical steel sheets for EV motors is expected to increase. The JFE Group has already marketed the JFE series of non-oriented electrical steel sheets, used in building motors, as part of the eco-product group. It is also contributing to the steel industry's decarbonization efforts.

Nonetheless, the situation for EV remains the same in terms of strong demand for weight reduction of body structure. JFE Steel has developed a cold-rolled steel sheet boasting 1.5 GPa-grade tensile strength as an eco-product and has put it into practical use as an automotive steel sheet. With its high strength, the product can significantly reduce the weight of a car frame and thus dramatically reduce CO₂ emissions from cars in motion.



High recyclability contributing to decarbonization is once again gaining attention, driving up steel demand. Steel is a highly recyclable material that can be reborn as many different products over and over again with no loss in its intrinsic quality. In the future, public resource recycling is expected to increase towards establishing a decarbonized society. We believe that the high recyclability of steel will gain attention once again in light of this transition.

Effect of trend to use multi-materials is limited.

Aluminum and carbon fiber reinforced plastic are potential alternative materials for reducing the weight of cars. It has been pointed out, however, that the production cost of these materials and the amount of CO₂ emitted throughout their life cycles is higher than those of steel. Therefore, under the 2°C scenario, which assumes the introduction of a carbon price, the price differential between steel and alternative materials will be larger. Under this scenario, while the trend of using multi-materials may show some progress for luxury cars, their use would be limited for economy cars. Moreover, considering a situation in which all panels used for doors and other parts of a luxury car were changed to aluminum, the effect on weight reduction could be expected to be 5% of all materials used in luxury and economy cars together. Multiplied by the number of cars produced, the impact over the total demand for automotive steel can be assumed to be limited.

FOCUS Key Factor ② Increase in Demand for Steel for Power Generation

Product contribution toward 2°C Scenario

Demand for power generation plants using non-carbon emitting renewable energies is expected to increase. The JFE Group engages in designing, procuring, constructing, and operating biomass, geothermal, and solar power generation plants in its engineering business. JFE Engineering is contributing to increasing power output at waste processing facilities from the perspective of resource recycling and efficient utilization of resources. JFE Engineering is striving to develop a fully automated operation to facilitate higher power output at incinerators.

Furthermore, we are working on reducing the additional use of materials derived from fossil fuels by using recycled materials in the production of plastic products. JFE Engineering undertakes the construction of recycling plants from design to procurement and construction as well as operation, and J&T Recycling Corporation operates a plastic recycling business.

Industry-wide decarbonization cannot be achieved only through technical developments in the manufacturing process alone. Therefore, we believe that demand for CCU and CCS facilities will increase as they facilitate the efficient use and storage of CO₂. JFE Engineering is able to undertake the entire process of building CCU and CCS facilities from design and procurement to construction.

From the perspective of the steel industry, there is space for disseminating eco solutions (energy-saving steel technology) in nations such as China, where close to 50% of the world's crude steel is produced, and India, where further growth in production is expected. The potential CO₂ reduction achieved by internationally transferring and disseminating advanced energy-saving technologies widely used in Japan will exceed 400 million t-CO₂ world-wide. Japan is estimated to contribute to the reduction of approximately 80 million t-CO₂ in 2030 through these technologies.



FOCUS Key Factor ③ Unstable Raw Material Procurement due to Increased Occurrence of Climatic Hazards

Ongoing initiatives to address the issue, such as alternative procurement and dispersed supplier bases, and increasing plant capacity.

In Australia, our major source country for raw materials, the occurrence of typhoons is predicted to double. We may be vulnerable in terms of continuous production and suffer a loss if production and shipping are interrupted for too long.

To address this issue, we are promoting alternative procurement and dispersed supplier bases as well as increasing plant capacity. Alternative procurement and dispersed supplier bases: Respond to disaster by carrying out spot procurement from China's port stocks. Increase procurement from closer source countries such as Russia and Indonesia and front-loading the purchase and order capacity. Increase procurement from outposts in unaffected regions of Australia. Also, use the stock and external capacity. Increase plant capacity: Increase production capacity by increasing production capacity through renovation and disaster recovery.

Measures are being taken toward 4°C Scenario

FOCUS Key Factor ④ Damage to Production Facilities

Measures against flood and drought in progress; Impact of flooding caused by rising sea levels can be addressed with current countermeasures.

We are taking action to minimize damage under the assumption that typhoons and heavy rains will become stronger and that the occurrence of disasters comparable to the torrential rain in western Japan in 2018 will rise. We have currently invested approximately 6.5 billion yen for disaster prevention at steelworks and strengthened drainage facilities and other assets. About 3.5 billion yen of separate investment has already been made to prepare for water shortages at steelworks by installing desalination facilities at some of the steelworks. Although no severe drought disaster has struck since the 1994 disaster, we are preparing to minimize any damage even if the frequency of occurrence should increase.

All steelworks are exposed to the risk of floods associated with rising sea levels because of their location in coastal areas. The estimated sea level rise by 2050 is 20 to 30 cm (70 cm by 2100 if the impact of climate change manifests itself at the highest level.) We believe that current measures against storm surge, which generates more sea level rise, are sufficient to address the risk. However, we will continue analyzing climatic hazards going forward so as to prepare for the changing circumstances.

FOCUS Key Factor ⑤ National Resilience

Contribution to national resilience with products such as a high-strength H-shaped steel, high-strength steel pipe, and hybrid tide environments.

The JFE Group is seriously considering the increased frequency of natural disasters. Also, the JFE Group is seriously considering the increased frequency of natural disasters. The JFE Group is seriously considering the increased frequency of natural disasters. The JFE Group is seriously considering the increased frequency of natural disasters.

The JFE Group will gather its collective energy to provide disaster prevention products such as a high-strength H-shaped steel, high-strength steel pipe, and hybrid tide environments in addition to the reconstruction of infrastructure.



KFSs

- Top level commitment
- Cross division/sector involvement
- Use assumptions in external scenarios
- Focus both on risks & opportunities



Disclose Mid/Long Term Measures toward Corporate Value Enhancement