WWF

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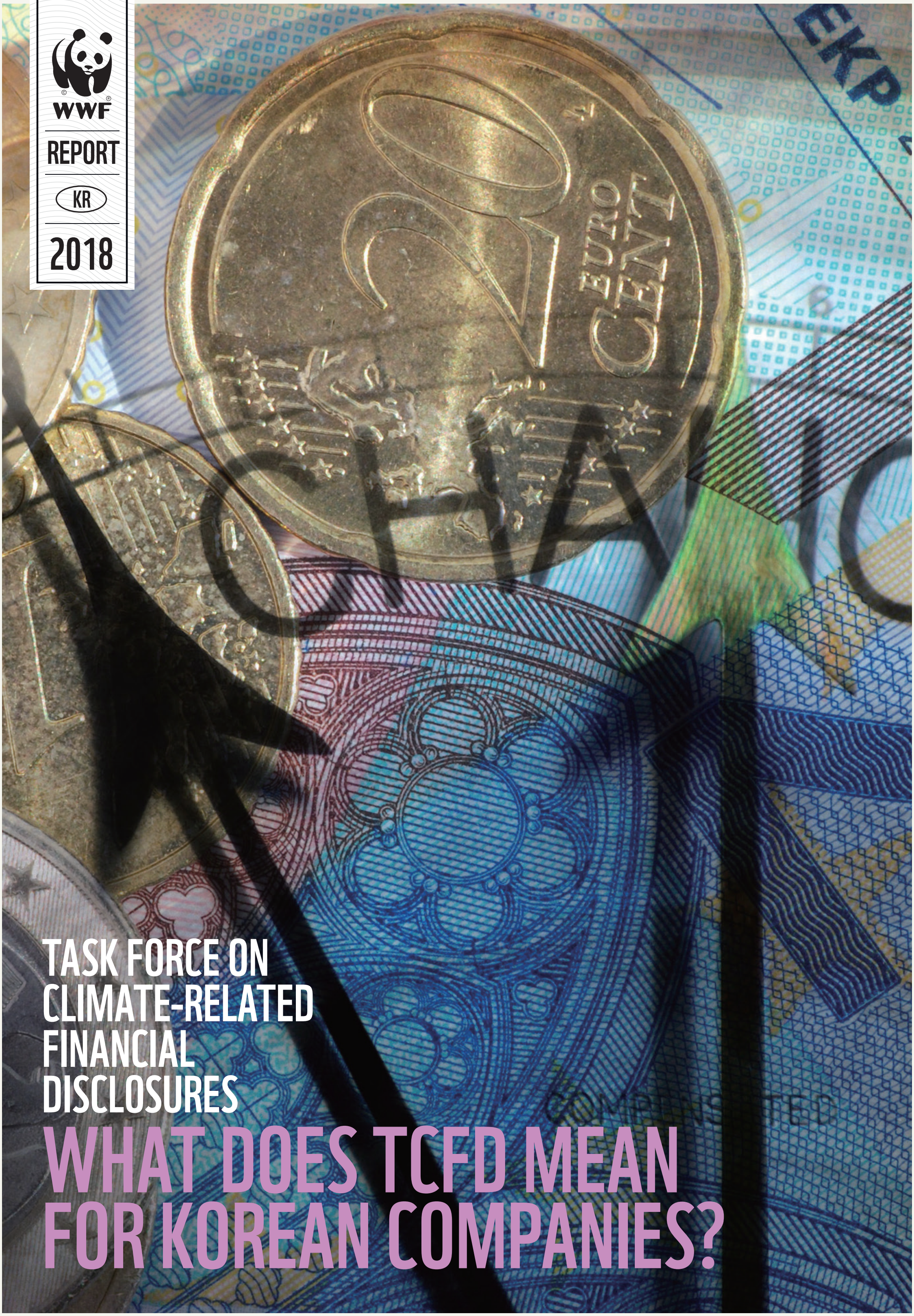

TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

WHAT DOES TCFD MEAN FOR KOREAN COMPANIES?

WWF (World Wise Fund for Nature)
WWF is one of the world's largest and most experienced independent conservation organizations, with over 5 million supporters and a global network active in more than 100 countries. WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable, and promoting the reduction of pollution and wasteful consumption. WWF-Korea was launched in 2014, after 10 years of conservation in Korea, based in Seoul.

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As part of WWF's Climate Action Conference 2018, this report contains the reviews of how the Task Force on Climate-Related Financial Disclosures ("TCFD") recommendations would financially affect Korean companies.

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FOREWORD

Simon Yoon
CEO, WWF-Korea

The year 2018 was exceptionally hot. Heatwaves caused an unprecedented damage of the crop which worth approximately KRW 11.4 billion in the Gyeongbuk region. In addition, natural disasters such as floods, typhoons, droughts, heavy snow and others are expected to be increased due to climate change.

This explains climate change is no longer considered as the problems only in highly vulnerable countries, but it has direct impacts on our daily life and activities. We are experiencing the speed of the climate change effects even with the 1 °C temperature rises. IPCC's special report "Global Warming of 1.5 °C" addresses that in order to keep global temperature rise below 1.5 °C, countries will have to cut global CO_2 emissions 45% below 2010 levels by 2030. 1.5 °C is a goal which must be achieved for the survival and prosperity of mankind.

In line with the 1.5 °C goal, various economic entities including corporations, governments, and financial institutions are working together on climate action. Among them financial trend is rapidly shifting in the way in which financial institutions withdraw investment in fossil-fuel based companies and invest in renewable energy. Global companies are actively responding to climate risk and opportunities.

To accelerate this paradigm shift, G20 asked the Financial Stability Board to review how the financial sector could incorporate issues related to climate change into economic decision making, and in December 2015, the board established a Task Force on Climate-related Financial Disclosures (TCFD) and developed recommendations.

In this report, WWF proposes a corporates' climate change strategy based on TCFD recommendations and financial impact analysis in relations to TCFD. Climate change is no longer a matter of regulatory response, it is a matter of survival and global market competitiveness. Starting with this report, WWF looks forward to Korean companies taking the lead in climate action.

Together possible!

SUMMARY

Chapter 1: New Demands of Low-Carbon Economy

- To achieve the Paris Agreement's 1.5 °C target, a rapid and broad transition to a low-carbon economy must be achieved. As a result, various stakeholders such as government, NGOs and investors are requesting companies to take climate action.

Chapter 2: G20-Launched TCFD's Proposal

- The G20 Finance Ministers and Central Bank Governors asked the Financial Stability Board ("FSB") to review how the financial sector can take account of climate-related issues. As such, the FSB established the Task Force on Climate-related Financial Disclosures ("TCFD") in December 2015. To reflect these climate-related risks and opportunities in financial disclosures that are adoptable to organizations across sectors and jurisdiction, the TCFD structured its recommendations around four areas that represent core elements of how organizations operate – governance, strategy, risk management, and metrics and targets.

Chapter 3: TCFD-Related Financial Impacts and Implementation

- To measure financial impacts of climate change, this report analyzes carbon credit reductions among other diverse risks of climate change. As a result of measuring the financial impact of reducing carbon emissions on TCFD's four major industries (energy; transportation; materials and buildings; and agriculture, food and forest products), this report shows the energy and materials and buildings will be significantly affected by carbon credits.
- Laws and regulations on domestic environmental disclosure do not fulfil various stakeholders' expectations. Even though Korean companies aiming for the global standard are disclosing climate-related information through CSR reports, these still needed to be complemented, compared to TCFD recommendations.
- To disclose climate-related information in line with the TCFD recommendations, a variety of issues are expected to arise in governance, strategy, risk management, and metrics and targets. This is not an issue which is limited to the process of disclosing information, but an issue which should be also considered in decision making process in advance.

Chapter 4: Takeaways

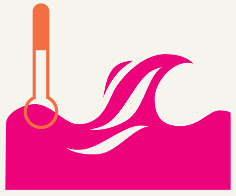
- To implement TCFD recommendations, (1) prioritization of climate change response (2) long-term governance strategy, risk management, metrics and target (3) measures such as clarifying roles and responsibilities of the board of directors of the company should be preceded.

CHAPTER 1
NEW DEMANDS OF LOW-CARBON ECONOMY

THE PARIS AGREEMENT AND 1.5℃ GOAL

On December 12, 2015, representatives of 196 nations gathered and adopted the Paris Agreement. As opposed to the existing international agreements relating to climate change, the Paris Agreement set detailed reduction targets for greenhouse gas ("GHG") emissions to keep the global average temperature rise well below 2°C compared to pre-industrial levels. Considering risks associated with a 2°C increase scenario, such as high sea level rise, the Agreement also set an "ambitious effort target" to limit the temperature increase even further to 1.5°C. As the global temperature has increased about 1°C above pre-industrial levels thus far, the international community should make further efforts to control the global temperature rise within 0.5°C to 1°C going forward.

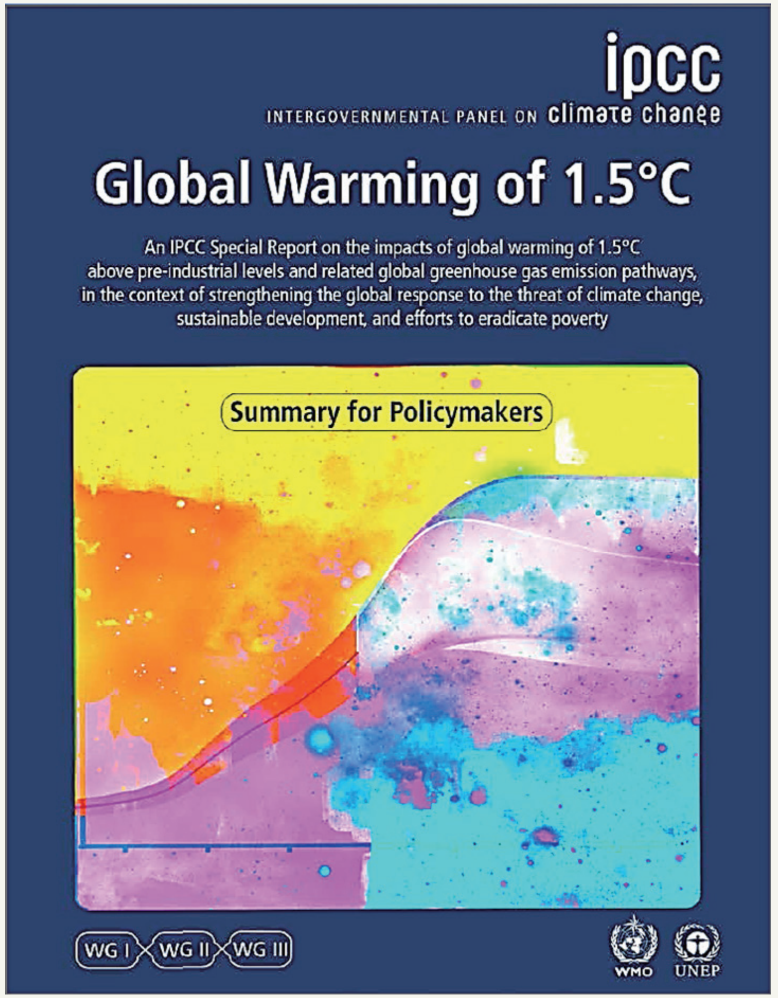
To underscore the importance of achieving the 1.5°C goal, the Intergovernmental Panel on Climate Change ("IPCC") has recently published the "Global Warming of 1.5°C" special report and "Summary for Policymakers," containing the executive summary thereof, based on analyses of climate change-related scenarios. In the above report, IPCC recommends that countries reduce CO_2 emissions by 45% by 2030 from 2010 levels and reach "net-zero" (a state in which CO2 emissions are completely offset by absorption) around 2050 to achieve the 1.5°C goal by 2100. In addition, IPCC assesses that a long-term response will only be possible when emissions of other GHGs, including methane, nitrous oxides and aerosols, are reduced along with CO2. The report also analyzes that a 1.5°C increase in the global average temperature would significantly reduce risks such as sea level rise, damage to infrastructure, flood, draught and biodiversity loss, compared to a 2°C increase, stressing the necessity of proactive responses to climate change by limiting the temperature increase to 1.5°C.[1]



The report also analyzes that a 1.5°C increase in the global average temperature would significantly reduce risks such as sea level rise, damage to infrastructure, flood, draught and biodiversity loss, compared to a 2°C increase, stressing the necessity of proactive responses to climate change by limiting the temperature increase to 1.5°C.

1. IPCC, Summary for Policymakers, 2018. 10. 8, the executive summary and special report are available at http://www.ipcc.ch/report/sr15/.

[Figure 1-1] IPCC "Summary for Policymakers" and "Global Warming of 1.5°C" Special Report[1]



Key stakeholders -governments, NGOs and financial institutions- are calling for new demands to achieve these new goals.

Keeping the global average temperature rise well below 1.5°C for the next 80 years to 2100 requires prompt and extensive transition to a low-carbon economy in all sectors from energy, manufacturing, real estate urban infrastructure to industrial system. To this end, key stakeholders—governments, NGOs and financial institutions—are calling for new demands to achieve these new goals.

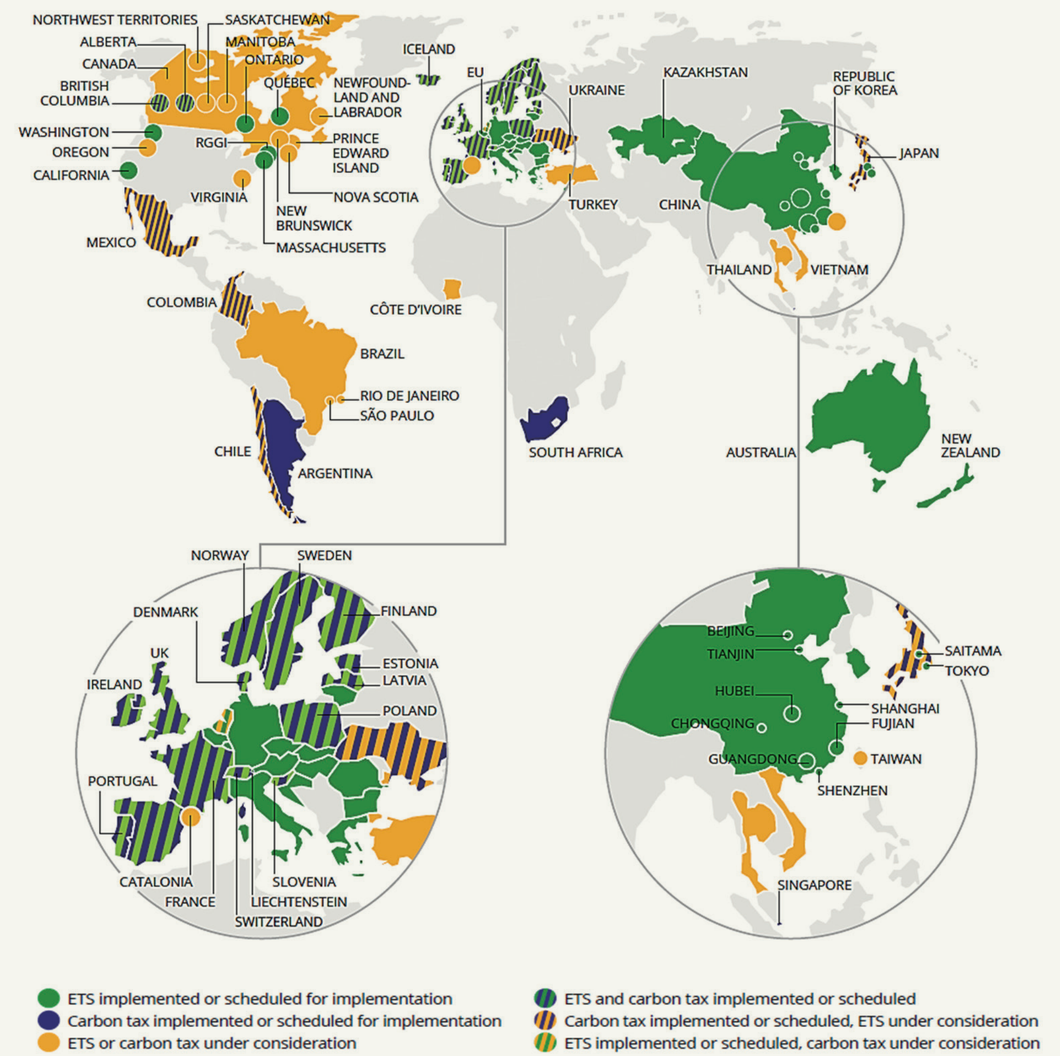
NEW DEMANDS FROM STAKEHOLDERS: GOVERNMENT

In general, policies for GHG reduction revolve around internally absorbing the external effects by pricing GHG emissions. Countries and local governments around the world are introducing “carbon pricing system” such as emission trading scheme (“ETS”) or carbon tax to fulfill obligations under the Paris Agreement.

As of April 2018, 45 countries and 25 local governments have either introduced, or planned to introduce some type of carbon pricing system, which is expected to control 20% of the global annual carbon emissions (11 GtCO2e). In addition, this year’s annual value of CO2 emissions allowances subject to ETS or carbon tax totals up to USD 82 billion, a 56% increase compared to last year. Furthermore, China has been developing a roadmap for ETS since the end of 2017, and if the trading begins in 2020 as planned, the country will be the largest carbon market in the world. Although the price of carbon is increasing, the price should increase further and reach between USD 40/tCO2e and USD 80/tCO2e by 2020 in order to achieve the temperature goal set under the Paris Agreement.[2]

This year’s annual value of CO2 emissions allowances subject to ETS or carbon tax totals up to USD 82 billion, a 56% increase compared to last year.

2. World Bank Group, State and Trends of Carbon Pricing 2018, 2018. 5



[Figure 1-2] Countries and Local Governments with ETS Implementation or Scheduled for Implementation[2]

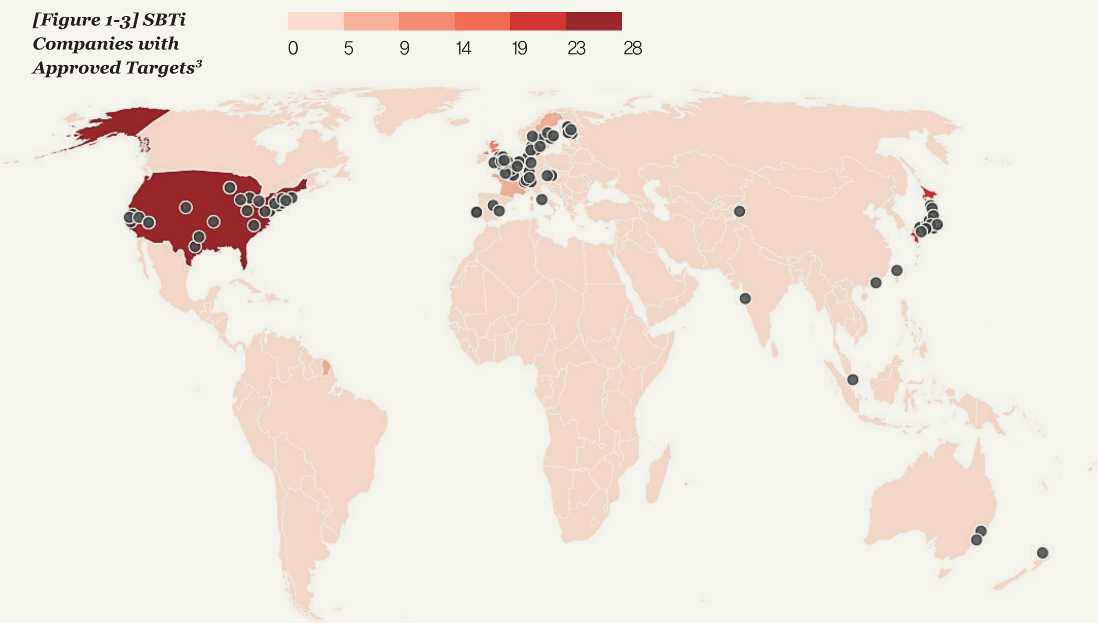
NEW DEMANDS FROM STAKEHOLDERS: NGO

As of today, about 498 companies around the world have signed a commitment letter to promise to set GHG emissions reduction targets.

Non-Governmental Organizations ("NGOs") also ask investors to take more responsible climate actions. "Science Based Targets Initiative ('SBTi')" is a chief example of ongoing global initiatives that support companies in setting meaningful GHG emissions reduction targets based on the goals agreed upon at the Paris Agreement.

SBTi was jointly initiated by World Wide Fund for Nature ("WWF"), Carbon Disclosure Project ("CDP"), UN Global Compact ("UNGC")and World Resource Institute ("WRI") to support companies in setting science-based GHG emissions reduction targets to hold the global average temperature rise below 2°C compared to pre-industrial levels. Once companies establish their own targets, experts within the SBTi review and certify the targets and share them on SBTi's website, encouraging companies to actively take action in achieving their reduction targets. As of today, about 498 companies around the world have signed a commitment letter to promise to set GHG emissions reduction targets, of which 151 companies have already had their science-based targets approved by experts.[3]

[Figure 1-3] SBTi Companies with Approved Targets[3]



3. SBTi, "Companies Taking Action," https://sciencebasedtargets.org/companies-taking-action/

Companies intending to participate in the SBTi can refer to the FAQs[4] board and "Science-based Target Setting Manual[5]" available at SBTi's website to learn how to set their own GHG emissions reduction targets according to Scope 1, Scope 2 and Scope 3. For companies wishing to utilize a Sectoral Decarbonization Approach ("SDA") for setting reduction targets, SBTi has developed an "SDA Tool," which is also available on its website, that helps calculate reduction targets.[6]

Beyond setting specific reduction targets, NGOs are also demanding implementation of reduction targets through proactive decarbonization actions. "Fossil Free" is one of such global campaigns pushing for fossil fuel divestment, and it has been strongly requesting local communities and institutions to stop investment in new businesses involving fossil fuels and use renewable energy sources instead.

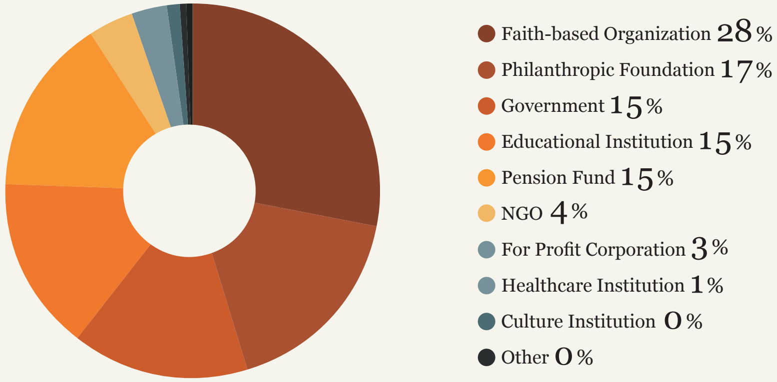
Fossil Free started as a students-led university divestment campaign in 2012 and was spread swiftly throughout the world, requiring local communities and institutions to take the following three actions:

- A fast and justified transition to 100% renewable energy for all
- No new fossil fuel projects anywhere
- No further investment in "brown energy" sources (e.g. coal, oil and gas) that emit greenhouse gases

A total of 991 institutions worldwide have decided to divest from fossil fuel projects, of which 15% are pension funds and government agencies, respectively.

According to Fossil Free, a total of 991 institutions worldwide have decided to divest from fossil fuel projects, of which 15% are pension funds and government agencies, respectively.[7] In particular, the lower house of Parliament of Ireland passed a legislation on July 12, 2018 that would recollect all public funds from coal, oil and gas companies, and it is now waiting for approval from the Senate and Prime Minister.[8]

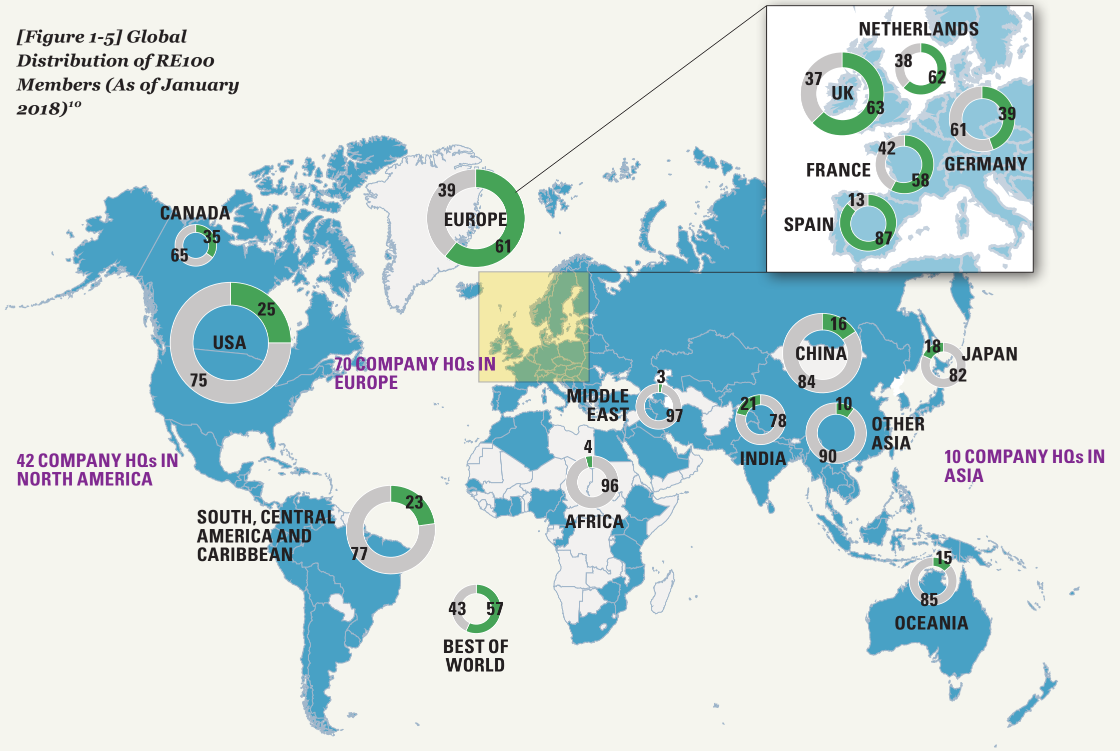
[Figure 1-4] Institutions Divesting from Fossil Fuel[7]



4. SBTi FAQs: https://sciencebasedtargets.org/faq/
5. SBTi, Science-based Target Setting Manual (Ver 3.0), July 2017. https://sciencebasedtargets.org/wp-content/uploads/2017/04/SBT-Manual-Draft.pdf
6. SDA Tool is available on SBTi's website: https://sciencebasedtargets.org/sda-tool/
7. Fossil Free https://gofossilfree.org/divestment/commitments/
8. New York Times, "Ireland Moves to Divest From Fossil Fuels", 2018. 7. 12; Joongang Ilbo, "Ireland's Lower House of Parliament Approved 'Fossil Fuel Free' Legislation... For the First Time in the World," 2018. 7. 13

Similarly, “RE100,” another global campaign pushing for decarbonization, recommends that companies implement fossil-free fuels using renewable energy. In September 2014, “The Climate Group,” a non-profit environmental organization, and CDP teamed up to launch RE100 to prompt companies to acquire electricity for their offices and facilities using 100% renewable energy. As of October 2018, 154 companies involved in various industries from IT, finance, insurance, automotive, apparel to food have joined RE100.[9]

[Figure 1-5] Global Distribution of RE100 Members (As of January 2018)[10]



Map: Area of RE100 company operations

Pie charts: % of members' electricity use sourced form renewable energy

% of members' electricity use not sourced form renewable energy

NGO-led movements such as the Fossil Free and RE100 not only encourage companies’ voluntary participation but also lead to legal actions in some cases. “Friends of the Earth,” a global environmental group, threatened Royal Dutch Shell that it would file a lawsuit against the global oil giant, if the company does not restructure its business to address climate change adaptations.

9. RE100 http://there100.org/companies
10. RE100, Approaching a tipping point: How corporate users are redefining global electricity markets, 2018. 1.

FRIENDS OF THE EARTH, THREATENED OIL COMPANY ROYAL DUTCH SHELL WITH LEGAL ACTION

On April 4, 2018, Friends of the Earth announced that it would file a lawsuit in the Netherlands if Royal Dutch Shell fails to bring its business into line with the Paris Agreement within eight weeks.[11]

In response, Royal Dutch Shell stated that it recognizes the risks of climate change and proactively supports the Paris Agreement. However, as climate change involves complex social issues, it should be addressed through government policies and changes in consumer culture. In addition, the company suggested a relatively ambitious goal to reduce carbon emissions by 50% around 2050 (which includes the company’s direct and indirect emissions and those generated due to the use of its products).

However, Friends of the Earth is of a position that such efforts are not sufficient enough to fulfill the Paris Agreement and is asking for binding regulations. Previously, lawsuits have been filed against five major oil companies in the U.S requesting compensation for incurred damages, but Friends of the Earth is the first to prepare a legal action that demands restructuring of corporate policies and businesses.

Royal Dutch Shell threatened with climate change legal action

Friends of the Earth to file lawsuit if oil group fails to commit to Paris agreement

Friends of the Earth says 'binding rules' are needed that make companies legally responsible for helping reduce carbon emissions in line with international targets © Getty

Andrew Ward, Energy Editor APRIL 4, 2018 19

Royal Dutch Shell has been threatened with legal action aimed at forcing the oil and gas group to shift away from fossil fuels in support of efforts to tackle climate change.

As of October 2018, 154 companies involved in various industries from IT, finance, insurance, automotive, apparel to food have joined RE100.

11. The Financial Times, “Royal Dutch Shell Threatened with Climate Change Legal Action,” 2018. 4. 4

NEW DEMANDS FROM STAKEHOLDERS: INVESTOR

With growing concerns that climate change may bring adverse impacts on the long-term profit of companies, financial institutions are shifting their focus to climate change as a key factor in making investment decisions. On September 12, 2018, "The Investment Agenda" was launched as part of Principles for Responsible Investment (PRI) in Person[12] and Global Climate Action Summit." Up to date, more than 400 global investors (managing assets worth USD 32 trillion) have expressed their intent to participate. The Investor Agenda recommends that investors take the following four actions and report the implementation progress in order to respond more proactively to climate change.

[Table 1-1] The Investor Agenda's Recommendations in Four Areas[13]

Areas	Detailed actions
Investment	• Investing in low-carbon businesses • Divesting from any business involving fossil fuels (coal, etc.) • Considering climate change in reviewing portfolios and making investment decisions
Corporate Engagement	• Signing on to the Climate Action 100+ [14] • Requesting companies to disclose their environmental information through CDP
Investor Disclosure	• Requesting companies to commit to reporting in line with TCFD
Policy	• Requesting world government leaders to implement and advocate policies to fulfill the goals under the Paris Agreement

The impact of Investor Agenda's recommendations on companies is well noted in the case of ING. For the first time among large-scale financial groups, ING has recently announced that it would consider companies' climate change actions when evaluating loan portfolios.

12. Principles for Responsible Investment (PRI) is a global network created to encourage investors to consider non-financial factors such as the environment, society and governance (ESG) in making investment decisions to ensure the sustainable management of companies.
13. AIGCC, "The Investor Agenda Fact Sheet (V2)", 2018. 9. http://www.aigcc.net/wp-content/uploads/2018/09/Investor-Agenda-Fact-Sheet-v2.pdf
14. Climate Action 100+ is a five-year initiative developed by investors to urge major GHG emitting countries and companies to achieve the goals under the Paris Agreement. Through such initiative, investors are requesting companies to reduce GHG emissions, transition to clean energy and improve their governance regarding climate change.

The Carbon Tracker found that USD 2.2 trillion of fossil fuel-related stranded assets may occur from 2015 to 2025, following the transition to the low-carbon economy.

ING LOAN PORTFOLIO ASSESSMENT

On September 17 2018, ING, a Dutch financial group, revealed its plan to assess whether its USD 600 billion loan portfolio is aligned with transition to the low-carbon economy required by the Paris Agreement. ING added that although companies' climate change strategies and implementation status would not conclusively determine the approval/disapproval of loans, it hopes to prompt companies to bring the discussion on response to climate change to a board level.[15]

To review companies' climate change actions, ING cooperated with "2˚C Investing Initiative (2ii)," a think tank, and developed an approach called "Terra." The Terra approach looks at the technology shift that is needed across certain sectors to keep the rise of global temperatures below 2℃. Terra will work in the following four steps: [16]

- Use scenarios (including those of International Energy Agency, "IEA") for the sectors responsible for most GHG emissions. These outline which technology must shift, by how much and by when to keep the rise in global temperatures to well below 2℃.
  - * Sectors responsible for most GHG emissions: energy, automotive, shipping & aviation, steel, cement, residential mortgages and commercial real estate
- Measure the technology shift needed against the actual technology clients are using today and planning on using in the future. Where relevant, look at whether individual clients have a strategy to adequately shift away from GHG-intensive technologies towards greener technologies
- Support clients on their path to a sustainable future and seek to support potential clients that are contributing to the technology shift needed.
- Measure the loan book to see whether it is aligned with the shift to a low-carbon society.

ING to assess $600bn loan portfolio based on climate impact

Dutch lender becomes first big bank to adopt policy pressing clients to meet Paris goals

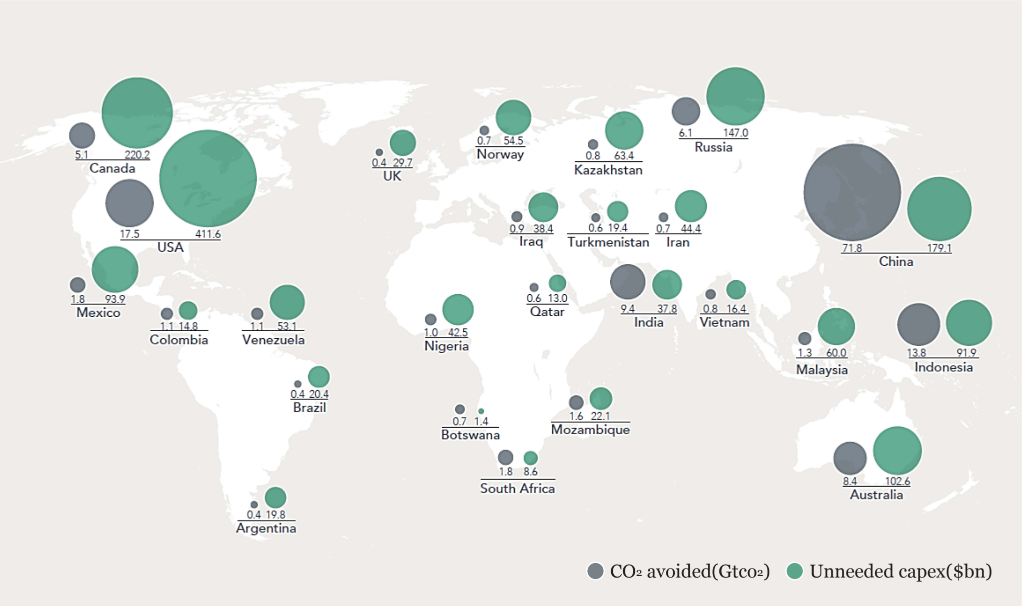
Some observers have linked the recent wild fires in California to climate change © Reuters

15. Financial Times(Korea), "ING to assess $600bn loan portfolio based on climate impact", 2018. 9. 17,
16. ING, "ING will steer portfolio towards two-degree goal to help combat climate change," 2018. 9. 14 https://www.ing.com/Newsroom/All-news/ING-will-steer-portfolio-towards-two-degree-goal-to-help-combat-climate-change.htm

Organizations need to examine their strategies from the perspectives of climate change.

Investors' demands for transition to low-carbon businesses partially stemmed from a concern that capital invested in fossil fuel projects may be reduced to "stranded assets" in the future. Climate change experts expect that, if institutions across the world divest from fossil fuel projects and transition to renewable energy projects to fulfill the Paris Agreement goals, the fossil fuel-related infrastructure will be reduced to stranded assets. Carbon Tracker, a non-profit think tank, compared and analyzed two different scenarios of (i) maintaining coal, oil and gas businesses as usual until 2035 and (ii) successfully controlling the global temperature rise within 2°C. The Carbon Tracker found that USD 2.2 trillion of fossil fuel-related stranded assets may occur from 2015 to 2025, following the transition to the low-carbon economy.[17]

[Figure 1-6] Expected Stranded Assets of Top 25 Supply Countries of Coal, Oil and Gas, and CO^2 that Should be Reduced by 2035 to Control the Global Temperature Rise within 2°C[17]



17. Carbon Tracker, The $2 trillion stranded assets danger zone: How fossil fuel firms risk destroying investor returns, 2018. 11. 24.
Carbon Tracker analyzed the IEA 450 scenario (long-term energy policy scenario for decarbonization) and reported that USD 1.9 trillion of the expected USD 2.2 trillion stranded assets (2015 - 2025), will occur from new fossil fuel businesses. It also assessed that CO2 emissions should be reduced at least by 156 GtCO2e compared to BAU for the next 20 years to limit the global average temperature within 2°C.

In addition, with global oil prices expected to be more volatile, uncertainties over the future oil industry will continue.[18] According to Korea Energy Economics Institute ("KEEI")'s report, after the plummet of global oil prices in 2014 that resulted from increased production of shale oil and OPEC's market share expansion policies, global oil prices have been fluctuating due to various factors such as reduced production in major oil producing countries, increasing non-conventional crude oil, excessive oil stock and changing dollar values. Further, KEEI stated that major energy-related institutions' different prospect for the future global oil prices (ranging from USD 80 to USD 124 by 2040) may imply greater possibility of growing uncertainties in the future oil industry. Because volatile global oil prices impose considerable risks to not only the oil industry but also the petrochemical industry, this may also increase uncertainties in investors' decision-making regarding future fossil fuel-related businesses.

The above stated new goals and demands for transition to low-carbon economies in themselves constitute sufficient reasons for organizations to review their corporate strategies. Organizations need to examine their strategies from the perspectives of climate change. Currently, most companies perceive environmental issues including climate change to be limited to environment-related departments, but there must be company-wide discussions to implement the demands from governments, NGOs and investors. Above all, because transition to a low-carbon economy involves material financial issues that may change companies' future investment plans, the board of directors and management, beyond environmental-related departments, should directly engage in reviewing and deciding on related matters.

TCFD's recommendations, to be described in the next chapter, were prepared to address the lack of understanding and discussion regarding climate change among board of directors and management. The recommendations provide guidelines to support companies in identifying climate change-related risks and opportunities and the roles and responsibilities of the board of directors and management to sufficiently respond to climate change. As stakeholders are calling for new demands, companies need to take note of the TCFD's recommendations.

As transition to a low-carbon economy involves material financial issues that may change companies' future, the board of directors and management should directly engage in reviewing and deciding on climate-related matters.

19. Korea Energy Economics Institute, Mid- to long-term development strategies for the Korean oil industry following changes in the structure of the global oil market (2nd year), 2017. 12. 31

CHAPTER 2
G20-LAUNCHED TCFD'S PROPOSAL

BACKGROUND

Since meteorological observation was first recorded in early 1900s, the temperature of the Korean peninsula has been constantly increasing at a rate of 0.18°C per every 10 years.[19] Although this number may look insignificant, this unusual trend has resulted in frequent natural disasters (e.g., earthquakes, typhoons, etc.), incurring serious damages to the economy.[20] This is more so in these days as the current economy is more developed and social structures are more complicated than before. Furthermore, this is the general phenomenon observed throughout the world.

The large-scale and long-term nature of the problem makes it uniquely challenging, especially in the context of economic decision making. To this extent, the financial sector was in great need of high-quality and decision-useful disclosures that enable them to understand the impact of climate change on business entities. The G20 Finance Ministers and Central Bank Governors asked the Financial Stability Board ("FSB") to review how the financial sector can take account of climate-related issues. As such, the FSB established the Task Force on Climate-related Financial Disclosures ("TCFD") in December 2015 to promote informed investment, credit, and insurance underwriting decisions, and to enable stakeholders to understand better the concentrations of carbon-related assets in the financial sector and the financial system's exposures to climate-related risks. Developing disclosure frameworks that can be internationally accepted for financial reporting and utilized by most providers of financial disclosures for one and half year, the TCFD released its final recommendations report and supporting materials on June 29, 2017.[21]

19. National Institute of Meteorological Sciences, Centennial Climate Change on the Korean Peninsula, 2018. 8. 16
20. Korea Environment Institute, Countermeasures to the loss and damage following the adverse impacts of climate change, 2017. 12. 31
21. (1) The Final Report - Task Force on Climate-related Financial Disclosures, Recommendations of the Task Force on Climate-related Financial Disclosures, 2017. 6. 29
(2) Annex to the Final Report - Task Force on Climate-related Financial Disclosures, Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures, 2017. 6. 29, Amended 2017. 12. 15
(3) Technical Supplement - Task Force on Climate-related Financial Disclosures, The Use of Scenario Analysis in Disclosure of Climate-related Risks and Opportunities, 2017. 6. 29

RISKS AND OPPORTUNITIES

The exposure level and the impact of climate-related issues may differ by sector, industry, geography, and organization. For this reason, there have been several climate-related disclosure frameworks emerged from different jurisdictions. Therefore, it was crucial to establish a consistent categorization of climate-related risks and opportunities, which are now defined in the TCFD's recommendations.

Under the TCFD's recommendations, climate-related risks are divided into two major categories: (1) risks related to the transition to a lower-carbon economy, which entails extensive changes in policy, legal, technology, and market to address mitigation and adaptation to climate change, and (2) risks related to the physical impacts of climate change, which can be event driven or longer-term shifts in climate patterns. One of the most noticeable risks from unusual shifts in climate patterns is fluctuation in price of raw material. For example, this summer's heat wave resulted in increased wheat prices due to reduction of wheat productivity in major growing areas.

Under the TCFD's recommendations, climate-related risks are divided into two major categories:
(1) risks related to the transition to a lower-carbon economy, which entails extensive changes in policy, legal, technology, and market to address mitigation and adaptation to climate change, and
(2) risks related to the physical impacts of climate change, which can be event driven or longer-term shifts in climate patterns.

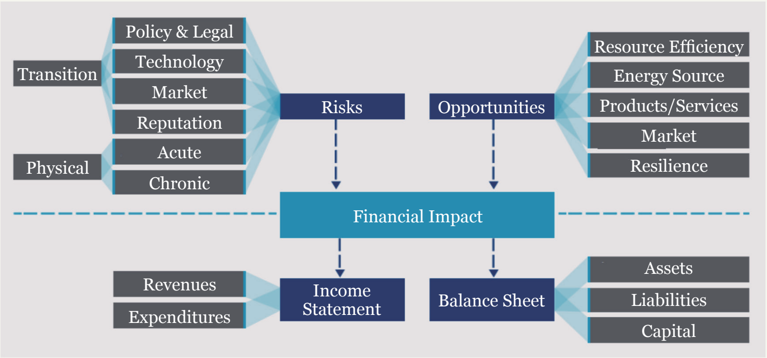
GLOBAL HEAT WAVE AND SOARING WHEAT PRICES

After years of over-supply, this year's heat wave is hitting wheat yields in key growing areas like Russia, Ukraine, France, Britain, Australia, China and other parts of Asia.[22] Chicago wheat futures hit three-year highs during first week of August, while a key European benchmark topped a four-year high. The price of Paris-traded milling wheat has leapt 33% during the first eight months of 2018. That is already translating into more expensive animal feed in some regions and could eventually mean more expensive food products.

On the other hand, climate-related opportunities can also arise through resource efficiency, cost savings, adoption of low-emission energy source, development of new products and services, building resilience along the supply chain.

To reflect these climate-related risks and opportunities in income statement, cash flow statement, and balance sheet, investors, lenders, and insurance underwriters need to understand how they are likely to impact a business entity's future financial decision, which is conceptually depicted in Figure 2-1.

[Figure 2-1] Climate-Related Risks, Opportunities, and Financial Impact [23]



22. Wall Street Journal, "Global Heat Wave Toasts Wheat and Prices Soar," 2018. 8. 4; Financial Times, "Drought turns up the heat on wheat producers," 2018. 7. 30; The Financial News, "Global Heat Wave and Soaring Wheat Prices," 2018. 8. 5
23. Page 8 of the TCFD Final Report

The TCFD has also identified four major categories, through which climate-related risks and opportunities may affect a business entity's current and future financial positions as follows:

[Table 2-1] Impact of Climate-Related Risks and Opportunities on Financial Positions [24]

Income Statement	
Revenues	Transition and physical risks may affect demand for products and services. Organizations should consider the potential impact on revenues and identify potential opportunities for enhancing or developing new revenues. In particular, given the emergence and likely growth of carbon pricing as a mechanism to regulate emissions, it is important for affected industries to consider the potential impacts of such pricing on business revenues.
Expenditures	An organization's response to climate-related risks and opportunities may depend, in part, on the organization's cost structure. Lower-cost suppliers may be more resilient to changes in cost resulting from climate-related issues and more flexible in their ability to address such issues. By providing an indication of their cost structure and flexibility to adapt, organizations can better inform investors about their investment potential. It is also helpful for investors to understand capital expenditure plans and the level of debt or equity needed to fund these plans. The resilience of such plans should be considered bearing in mind organizations' flexibility to shift capital and the willingness of capital markets to fund organizations exposed to significant levels of climate-related risks. Transparency of these plans may provide greater access to capital markets or improved financing terms.
Balance Sheet	
Assets and Liabilities	Supply and demand changes from changes in policies, technology, and market dynamics related to climate change could affect the valuation of organizations' assets and liabilities. Use of long-lived assets and, where relevant, reserves may be particularly affected by climate-related issues. It is important for organizations to provide an indication of the potential climate-related impact on their assets and liabilities, particularly long-lived assets. This should focus on existing and committed future activities and decisions requiring new investment, restructuring, write-downs, or impairment.
Capital and Financing	Climate-related risks and opportunities may change the profile of an organization's debt and equity structure, either by increasing debt levels to compensate for reduced operating cash flows or for new capital expenditures for R&D. It may also affect the ability to raise new debt or refinance existing debt, or reduce the tenor of borrowing available to the organization. There could also be changes to capital and reserves from operating losses, asset write-downs, or the need to raise new equity to meet investment.

24. Page 9 of the TCFD Final Report

RECOMMENDATIONS AND GUIDANCE

To reflect these climate-related risks and opportunities in financial disclosures that are adoptable to organizations across sectors and jurisdiction, the TCFD structured its recommendations around four areas that represent core elements of how organizations operate – governance, strategy, risk management, and metrics and targets. The TCFD's recommendations also provide supplemental guidance for financial sector (e.g., banks, insurance companies, asset managers, and asset owners) and non-financial groups (e.g., energy, materials and buildings, transportation, and agriculture, food, and forest products).

[Figure 2-2] Core Elements of Recommended Climate-Related Financial Disclosures[25]

Governance
The organization's governance around climate-related risks and opportunities

Strategy
The actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planing

Risk Management
The processes used by the organization to identify, assess, and manage climate-related risks

Metrics and Targets
The metrics and targets used to assess and manage relevant climate-related risks and opportunities

1. Governance

Recommendation

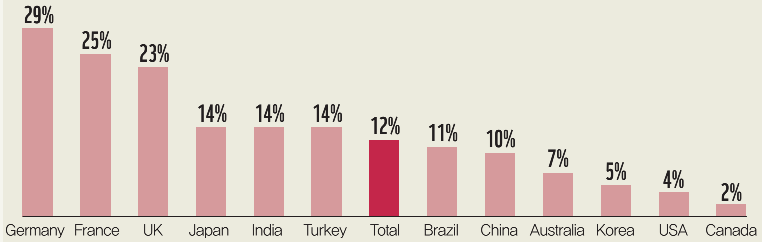
Understanding the role of organization's board in overseeing climate-related issues is important to stakeholders of climate-related disclosures. To that extent, the TCFD recommends organizations to disclose whether their board of directors or management is directly involved in making decisions on climate-related issues:

- Describe the board's oversight of climate-related risks and opportunities
- Describe management's role in assessing and managing climate-related risks and opportunities

25. Page V of the TCFD Final Report

CURRENT STATUS IN S. KOREA

Globally only 12% of organizations are providing incentives to the board for managing climate related issues, and only 5% of organizations in South Korea do so.



Percentage of companies by country providing incentives to the board for the management of climate-related issues[26]

Therefore, to check whether they are in alignment with TCFD's recommendation on governance, S. Korean organizations should consider the following items:

- Within the organization, who is responsible for managing climate-related issues? Is it a sole responsibility of an individual or group within the organization (such as the sustainability team) as opposed to the board of directors?
- If the board of directors is involved, does the organization have monetary and/ornon-monetaryincentivestoboardmembersforthemanagementofclimate-related issues?

2. Strategy

Recommendation

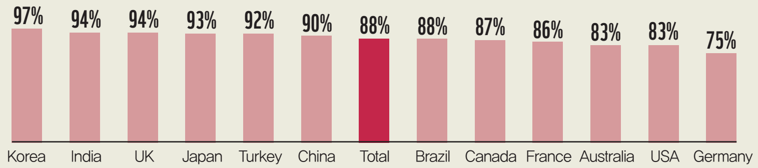
How organizations respond to climate-related risks and opportunities may affect an organization's business, strategy, and financial planning over a period of time, and provide useful information on its resilience on climate-related issues. To that extent, the TCFD recommends organizations to disclose how this strategy assessment is incorporated into existing business strategies:

- Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term
- Describe the impact of climate-related risks and opportunities on the organization's business, strategy, and financial planning
- Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario

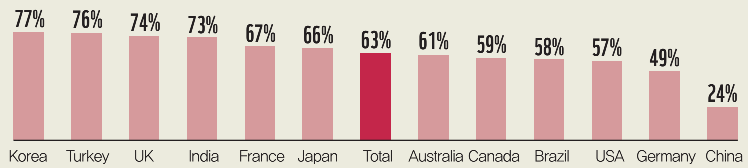
26. Climate Disclosure Standards Board & Carbon Disclosure Project, Are Companies Prepared for the TCFD recommendations?, March 2018, at page 8. This study analyzes the disclosures from 1,681 companies across 14 countries and 11 sectors to the CDP Questionnaire in 2017, which were made around the time of the launch of the final TCFD recommendations in June 2017.

CURRENT STATUS IN S. KOREA

Approximately 90% of organizations worldwide, including those in S. Korea, identify government regulations as risks. Furthermore, over half of organizations worldwide and 77% of organizations in S. Korea identify their reputation and/or changing consumer behavior as risks.



Percentage of companies by country identifying regulatory risks[27]



Percentage of companies by country identifying reputation and/or changing consumer behavior as risks[28]

To check whether such risk identifications are in alignment with TCFD's recommendations on strategy, S. Korean organizations should consider the following items:

- Does the organization consider climate-related regulations and changes in reputation and/or consumer behavior as risks?
- Does the organization consider climate-related risks and opportunities in the short term and/or long term?
- Does the organization integrate climate-related risks and opportunities into organization-wide process?

26. Id., at page 17.
27. Id., at page 19.

3. Risk Management

Recommendation

Stakeholders need to understand how organization identifies, assesses and manages climate-related risks and opportunities as part of its overall risk management process. To that extent, the TCFD recommends organizations to disclose whether proper processes are established within the organizations:

- Describe the organization's processes for identifying and assessing climate-related risks
- Describe the organization's processes for managing climate-related risks
- Describe the how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management

4. Metrics and Targets

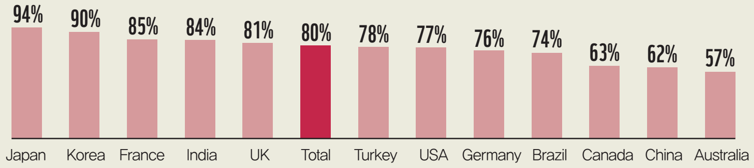
Recommendation

Access to the metrics and targets established by organizations provides stakeholders a means to assess the organizations' potential risk-adjusted returns, ability to meet financial obligations, general exposure to climate-related issues, and progress in managing or adapting to those issues. To that extent, the TCFD recommends organizations to disclose whether such metrics and targets are established:

- Describe the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process
- Describe Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks
- Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets

CURRENT STATUS IN S. KOREA

Following government regulations, organizations generally have absolute and/or intensity emission targets or renewable energy consumption and/or production targets. In S. Korea, 90% of organizations of such environmental targets.



Percentage of companies by country with emission reduction or renewable energy consumption or production target[29]

To check whether their targets are in alignment with TCFD's recommendation on metrics and targets, S. Korean companies should consider the following items:

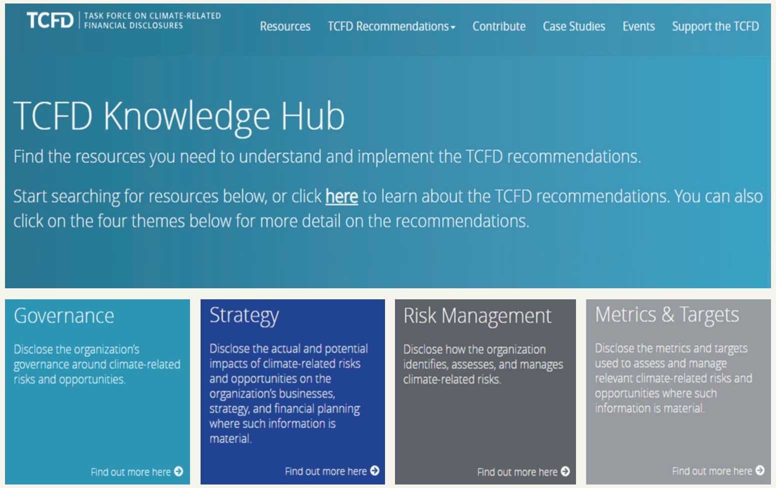
- Does the organization have climate-related targets such as emission targets or renewable energy production/consumption targets? What kind of metrics are used for setting those targets?
- Is target achievement incorporated into organizational performance?

29. Id., at page 24.

TCFD KNOWLEDGE HUB

To assist organizations to implement recommended disclosures, the TCFD launched a web-based platform known as TCFD Knowledge Hub[30]("Hub") which contains over 400 guidance documents, tools, and resources. In particular, the Hub provides guidance for all sectors on each of the four core elements (i.e., governance, strategy, risk management, and metrics and targets) and supplemental guidance for financial v. non-financial groups. The Hub further provides glossary, implementation path, case studies, and other information such as how the TCFD recommendations are aligned with other disclosure frameworks.

[Figure 2-3] Screenshot of TCFD Knowledge Hub



Established under the G20's request, the TCFD recommendations and guidance are products of thorough research and review from global experts on climate and finance. Because of its significance, Bank of Korea mentioned TCFD on its 2018 "Climate Change and Financial Risks Report" to discuss on the risks and opportunities associated with climate change.[31] As such, organizations in financial sectors and non-financial sectors will eventually have to pay attention to the TCFD recommendations to understand how to better adapt their businesses in response to climate change.

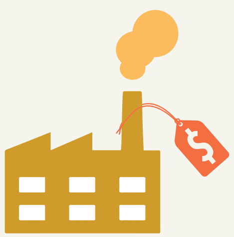
30. TCFD Knowledge Hub https://www.tcfdhub.org/
31. Bank of Korea, Climate Change and Financial Risks Report, 2018. 6. 28

CHAPTER 3

TCFD-RELATED FINANCIAL IMPACTS AND IMPLEMENTATION

EXPECTED FINANCIAL IMPACTS ON CARBON EMISSION REDUCTION

The assumptions in this chapter are made only for the least financial impacts based on carbon credits, one of the risk factors.



In the foregoing, we explained that TCFD's recommendations were prepared to support investors in understanding the financial impacts of climate change on companies and thereby making right investment decisions.

Although risks and opportunities accompanied by climate change have directly and indirectly affected financial statements of companies thus far, it is difficult to separate financial impacts of climate change from companies' financial statements disclosed in Korea due to the limitations in current legal and accounting standards. This is one of the reasons that each stakeholder makes different arguments on climate change's financial impacts. Therefore, in this chapter, we analyzed carbon credit reductions for which we expect to measure financial impacts, among other diverse risks of climate change.

We expect that financial impacts from carbon credit reduction can be roughly estimated based on certain assumptions because carbon credits have already been allocated for each company, local government and place of business in Korea, and ETS was implemented through Korea Exchange ("KRX") to enable objective assessment of carbon credit prices.

However, please note that the assumptions in this chapter are made only for the least financial impacts based on carbon credits, one of the risk factors. Companies will face numerous risks relating to law, market and reputation due to climate change, and if such risks are considered altogether, the financial impacts of climate change on companies will well exceed the carbon emissions reduction costs.

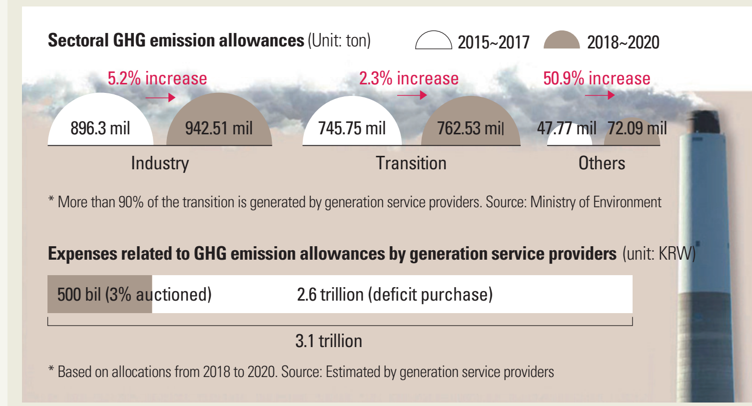
As identified in the following case, reductions in carbon credits alone will have considerable financial impacts on certain industries, and therefore, in this chapter, we assessed the impact that carbon credit reductions will bring on each key industry. We used TCFD's industry categorization for such analysis.

TCFD selected four major industries (energy; transportation; materials and buildings; and agriculture, food and forest products) in the non-financial sector comprising the largest part of GHG emissions, energy use and water use and announced supplemental guidance for each industry, aside from the basic recommendations. As we consider that the four industries will have the greatest financial impacts relating to climate change in the non-financial sector, we estimated the financial impacts of carbon emissions reduction on each industry.

Companies will face numerous risks relating to law, market and reputation due to climate change, and if such risks are considered altogether, the financial impacts of climate change on companies will well exceed the carbon emissions reduction costs.

KRW 3 TRILLION FOR REDUCING GREENHOUSE GAS, STRIKING POWER GENERATION SERVICE PROVIDERS

At the cabinet meeting held on July 24th, the Ministry of Environment announced that the revised draft for the "2030 Greenhouse Gas Reduction Roadmap" and the "2nd stage allocation plan for carbon credits (2018-2020)" have finally been confirmed , which would hit power generation service providers the hardest...[32] [Omitted] Power generation service providers estimated that it will cost a total of KRW 2.6 trillion to fill the discrepancies from what is allocated for the next three years. Considering the additional KRW 500 billion that power generation service providers are about to bear for the purchase of allocated portions for the same period, the total costs relating to greenhouse gas will add up to KRW 3.1 trillion.



[Figure 3-1] TCFD's Categorization of Industries[33]

Energy	Transportation	Materials and Bulldings	Agrlculture, Food, and Forest Products
Oil and Gas; Coal; Electric Utilities	Air Freight; Passenger Air Transportation; Maritime Transportation; Rail Transportation; Trucking Services; Automobiles and Components	Metals and Mining; Chemicals; Construction Materials; Capital Goods; Real Estate Management and Development	Beverages; Agriculture; Packaged Foods and Meats; Paper and Forest Products

* Domestic manufacturers of steel, cement and petrochemical products are included.

32. Maeil Business Newspaper, "KRW 3 Trillion for 'Reducing Greenhouse Gas,' Striking Power Generation Service Providers" 2018. 7. 24

Reduction in permitted carbon emissions is expected to affect the energy sector and materials and buildings sector most, and the decreased operating profit is likely to reduce the corporate value by 35% in the energy sector and 19% in the materials and buildings sector.

Below are the population, methodologies and major assumptions to estimate the industry-specific financial impacts in this report:

- Out of 960 companies[34], businesses and local governments subject to the carbon credit allocation/management as designated by respective government agencies (the Ministry of Land, Infrastructure and Transport, the Ministry of Agriculture, Food and Rural Affairs, the Ministry of Trade, Industry and Energy and the Ministry of Environment), 633 companies whose financial information are available were analyzed
- Sorted out the industries that are deemed to fall under each of TCFD's sector criteria, i.e. (i) energy, (ii) transportation, (iii) materials and buildings and (iv) agriculture, food and forest products
- Assuming that each company achieves the 20% carbon reduction goal by purchasing carbon credits, assessed financial impact by calculating the differences in operating profit and corporate value between before and after the carbon credit purchase of 2017
- The cost resulting from reduction in carbon credits is calculated by multiplying the carbon credit price with each sector's emission reduction target
- KRW 23,500, the average price of KAU18 and KOC that are carbon credit issues traded on KRX as of September 6, 2018, applied[35]

The industry-specific financial impacts of the obligation to reduce carbon emissions are analyzed in the table below. Reduction in permitted carbon emissions is expected to affect the energy sector and materials and buildings sector most, and the decreased operating profit is likely to reduce the corporate value by 35% in the energy sector and 19% in the materials and buildings sector, respectively.

Below are the analytical limits:

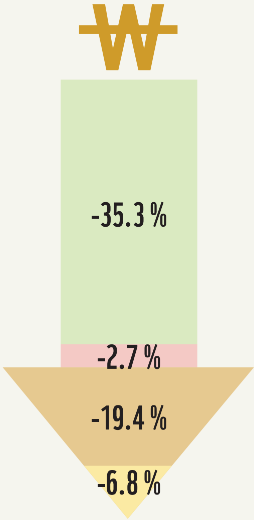
- The analysis used the operating profit data of 2017 and does not reflect changes in each company's operating profit in the following year.
- The analysis does not reflect changes in carbon credit prices after the analysis.
- The effect on operating profit may also be smoothed if carbon emissions are gradually reduced (instead of at once in a year). However, since the carbon emissions reduction (20%) should be maintained after 2030, the financial effect on year 2030 and the following years would be similar to the amount calculated herein.

33. Page 16 of the TCFD Final Report
34. National Greenhouse Gas Management System
35. KRX Market data – Market price table of carbon credits

[Table 3-1] Expected Financial Impacts by Industry Following Carbon Emissions Reduction

Category	Energy	Transportation	Materials and Buildings	Agriculture, Food and Forest Products
No. of affected companies/ businesses	53	162	344	74
Total cost of emissions reduction (20%)*	KRW 1,354.3 billion	KRW 97.8 billion	KRW 1,308.2 billion	KRW 50.3 billion
Ratio of emissions reduction cost to sales	3.2%	0.1%	0.8%	0.3%
Average cost of emissions reduction by company	KRW 25.6 billion	KRW 0.6 billion	KRW 3.8 billion	KRW 0.7 billion
Effect on operating margin (reduction rate)	9.0% → 5.8% (-35.3%)	4.6% → 4.5% (-2.7%)	4.3% → 3.5% (-19.4%)	4.8% → 4.4% (-6.8%)

* Domestic manufacturers of steel, cement and petrochemical products are



As shown in the above analytical result, the obligation to reduce carbon emissions alone will have considerable financial impacts on the energy industry and materials and buildings industry. The above analysis was conducted based on the current market price, but when considering more stringent regulation on carbon emissions, the carbon credit price will rise in phases,[36] brining greater financial impacts in the future. In addition, given that the energy and materials and buildings sectors are the foundation for all industries, financial impacts on such industries will also financially affect other industries.

Moreover, if risks that cannot be identified by the current accounting and disclosure standards are considered, in addition to the above carbon credit-adjusted impacts, the impacts may be as strong as to threaten the "Assumption of Going Concern" [37] for some companies.

Meanwhile, the above analysis is under the assumption of achieving the obligation to reduce carbon emissions through the purchase of carbon credits, and therefore, if a company successfully prepares a more effective way to reduce carbon emissions, they may turn risks into opportunities.

36. A reasonable carbon price trajectory to support the Paris Agreement has been proposed to start from at least $40-80 per tonne of CO2 by 2020, rising to $100 by 2030, and eventually topping $400 by 2050, but regional and national context mean generalizing is difficult. Exponential Climate Action Roadmap, 2018
37 "Assumption of Going Concern" is the assumption that an entity will remain in business for the foreseeable future unless such entity intends to halt its operations or liquidate its assets, or it is under a circumstance that does not allow its continual operation.

ANALYSIS OF IMPLEMENTATION PROGRESS OF TCFD RECOMMENDATIONS

As the financial impacts of climate change will have significant impacts on the financial performance of a company, stakeholders including investors will be inclined to identify climate change's impacts on companies in further detail. This is eventually related to how each company discloses or makes public the information on climate change and the environment. In this section, we analyzed laws and regulations that require companies to disclose information relating to climate change or environment and check the companies' disclosure status indicated in their sustainability report against TCFD's recommendations.

Domestic laws and regulations specifying Korean companies' disclosure on climate change and the environment include the Regulations on Public Disclosure on the Securities Market, Regulations on the Issuance and Disclosure of Securities, etc., Environmental Technology and Industry Support Act and Framework Act on Low Carbon, Green Growth. The [Table 3-2] below explains the enforceability of such laws and regulations, companies subject to disclosure, detailed matters to be disclosed, where such disclosures should be made and limits from the perspectives of information users.

As such, the domestic laws and regulations on the environment face limits from the perspectives of information users, and even when compared to TCFD's recommendations, they only require limited information to be disclosed.

Such limited disclosures required by domestic laws and regulations make it difficult to disclose information on climate change to the satisfaction of diverse stakeholders in and out of Korea. However, Korean companies that seek global standards mostly disclose information on climate change and the environment through their sustainability report pursuant to GRI[39] to supplement disclosures on climate change.

38. KRX regulations website and Korea's National Law Information Center
39. Global Reporting Initiative is an international organization that provides guidelines on sustainability reports.
40. Carbon Disclosure Project plays the role of a council to assess how "FT500 global index" companies (500 companies with the highest market capitalization) respond to CO2 reduction. It was launched with the support of 35 institutional investors in Europe in 2000 and is based in the U.K. Since 2003, it has researched risks and opportunities facing major global companies relating to climate change, methods to reduce carbon emissions and annual reduction plan and announced the result thereof. In case of Korea, 50 countries with the highest market capitalization are subject to the research.

In this section, we selected two companies that received CDP[40] Awards for several years and checked their disclosures against TCFD's recommendations, to identify the scope of climate change information disclosed by Korean companies in their sustainability report.

[Table 3-2] Details of Domestic Laws and Regulations on Climate Change and the Environment[38]

Category	Enforcement Procedures for the Regulations on Public Disclosure on the Securities Market	Regulations on the Issuance and Disclosure of Securities, etc.	Environmental Technology and Industry Support Act	Framework Act on Low Carbon, Green Growth
Whether Compulsory	Voluntary disclosure	Compulsory	Compulsory	Compulsory
Companies Subject to Disclosure	Companies listed on the securities market	Among companies required to submit annual business reports, companies subject to management under the Framework Act on Low Carbon, Green Growth, companies certified for green technology/ industry and green companies under the Environmental Technology and Industry Support Act	Green companies under the Environmental Technology and Industry Support Act, public institutions prescribed by Presidential Decree and companies having significant environmental effects	Companies subject to management under the Framework Act on Low Carbon, Green Growth
Matters to be Disclosed	Matter related to information on green management	Matters regarding GHG emissions and energy use, certified matters regarding green technology/ industry, and matters regarding designation of green companies, etc.	Goals and major action plans for environment protection, resource saving, pollutant emissions reduction, etc.	GHG emissions status, energy use, etc.
Disclosure via	DART, securities information terminal and securities market magazines	Annual business report	Environmental information disclosure and verification system	Website of relevant authority for each sector or the central integrated GHG information management system
Limits	Only few cases of disclosure as disclosure is voluntary; not applicable to unlisted companies	Difficult to estimate risks for companies simply based on GHG emissions information.	Disclosure media are not well known to general users of disclosed financial information (shareholders, creditors, regulatory authorities, etc.). Difficult to convert into monetary value	

[Table 3-3] Comparative Review of TCFD's Recommendations and Best Cases in Korea Indicated in Sustainability Reports

Category	TCFD Recommendations	Recipients of CDP Awards	
		Disclosure	
Governance	a. Describe the board's oversight	X	Did not directly describe supervision of the board of directors
	b. Describe management's role in assessing and managing risks and opportunities	△	Described the composition of energy committee/ environmental management committee including the management
Strategy	a. Describe risks and opportunities identified over the short, medium, and long term	△	Described review of short-term financial/ product manufacture risks and expansion of business portfolio through medium/long term R&D
	b. Describe the impacts on the businesses, strategy, and financial planning	△	Described counterstrategies in relation to carbon credits/ company-wide counter strategies against climate change
	c. Describe the organization's resilience	X	Did not mention resilience
Risk Management	a. Describe processes for identifying and assessing climate-related risks.	△	Described internal monitoring system
	b. Describe processes for managing climate-related risks.	△	Described organization's processes by dividing them into visions, goals, missions and key challenges/ reporting processes after identifying risks opportunities
	c. Describe how above processes are integrated into the overall risk management	△	Did not mention integration of the processes into the overall risk management
Metrics and Targets	Disclose the metrics used to assess climate-related risks and opportunities	△	Disclosed GHG reduction targets from BAU and CO2 emissions per ton of products
	b. Disclose Scope 1, Scope 2 (and Scope 3 GHG emissions) and related risks	O	Disclosed GHG emissions of Scope 1, Scope 2 and Scope 3
	C. Describe the targets used by the organization	△	Described GHG reduction targets

Although the sustainability reports prepared in accordance with GRI standards provides more comprehensive and easily understandable information for information users than those required by domestic laws and regulations on disclosures on climate change, some parts need to be supplemented in comparison with TCFD's recommendations. For example, some information such as oversight of the board of directors or resilience of organizations relating to climate change is not or insufficiently disclosed.

This issue may have arisen from the limited nature of information required by disclosure laws and regulations but may also be attributable to Korean companies which entrust climate change issues to environment-related departments and handle it as a one-time project, although such issues should be dealt with at corporate levels in the long term.

IDENTIFICATION OF ISSUES IN IMPLEMENTING TCFD RECOMMENDATIONS

If companies make disclosures in accordance with TCFD's recommendations as above, the following issues may arise in each key category of TCFD (governance, strategy, risk management and metrics and targets):

[Table 3-4] Considerations Following the Implementation of TCFD Recommendations

Category	Issues to Consider
Governance	• The board's responsibilities are not specified • Lack of internal reporting line addressing environmental issues
Strategy	• Lack of medium and long term strategic approach to climate change • Lack of detailed climate-related scenario analysis and review of financial modeling strategies
Risk Management	• Risk management system limited to short-term responses and lacking medium/long term approach. • Lack of organization-wide risk management system.
Metrics and Targets	• Lack of expertise to assess feasibility and appropriateness of targets and metrics • Lack of compensation system for assessment of climate-related performance.

These are not the issues that only arise in disclosing information on climate change in accordance with TCFD's recommendations; they should be considered in making corporate decisions before being disclosed. Therefore, to implement disclosures pursuant to TCFD's recommendations, each company's underlying structural factors should be considered in advance.

CHAPTER 4
TAKEAWAYS

RECOMMENDATION FOR FINANCIAL INSTITUTIONS AND CORPORATIONS

People around the world and the planet Earth are suffering from environmental issues such as heat waves and fine dust. Meanwhile, companies are also exposed to physical risks caused by flood, draught and abnormal high temperature and other diverse risks following the demands for transition to a low-carbon economy. If companies fail to flexibly respond to fluctuating raw material prices, consumers' growing attention to environment and health issues and stronger environmental policies and regulations, the Assumption of Going Concern will not be effective any longer.

Company stakeholders are also calling for new demands in alignment to such changes. A major governmental carbon policy, ETS, is expected to deteriorate companies' operating profit and corporate value. NGOs and investors are increasingly creating a global trend to steadily reduce extraction of fossil fuels, and some companies have faced compensation lawsuits for going against such trend. Furthermore ass G20, a representative body of global leaders, formed a taskforce to receive reports on climate change actions from companies, the level of stakeholders' demand has also increased significantly. Therefore, climate actions are no longer a matter of choice for companies to overlook.

If companies and financial institutions leverage the above takeaways in communicating with their key stakeholders, including shareholders by customizing them to their own circumstances and reporting the result thereof to the board of directors (proactive disclosures through the sustainability report and other diverse initiatives), this will not only help them manage their corporate value but also turn risks to opportunities.

Companies face some issues in implementing TCFD's recommendations:

- Stakeholders find it difficult to assess risks due to the voluntary, limited and unintegrated nature of disclosures by financial institutions and companies.
- Objective assessment of risks and opportunities through the sustainability report is not easy because some companies disclose unstandardized information.
- Above all, although responses to climate change should be company-wide, the issues are handled only by one or two responsible departments or neglected by the board of directors.

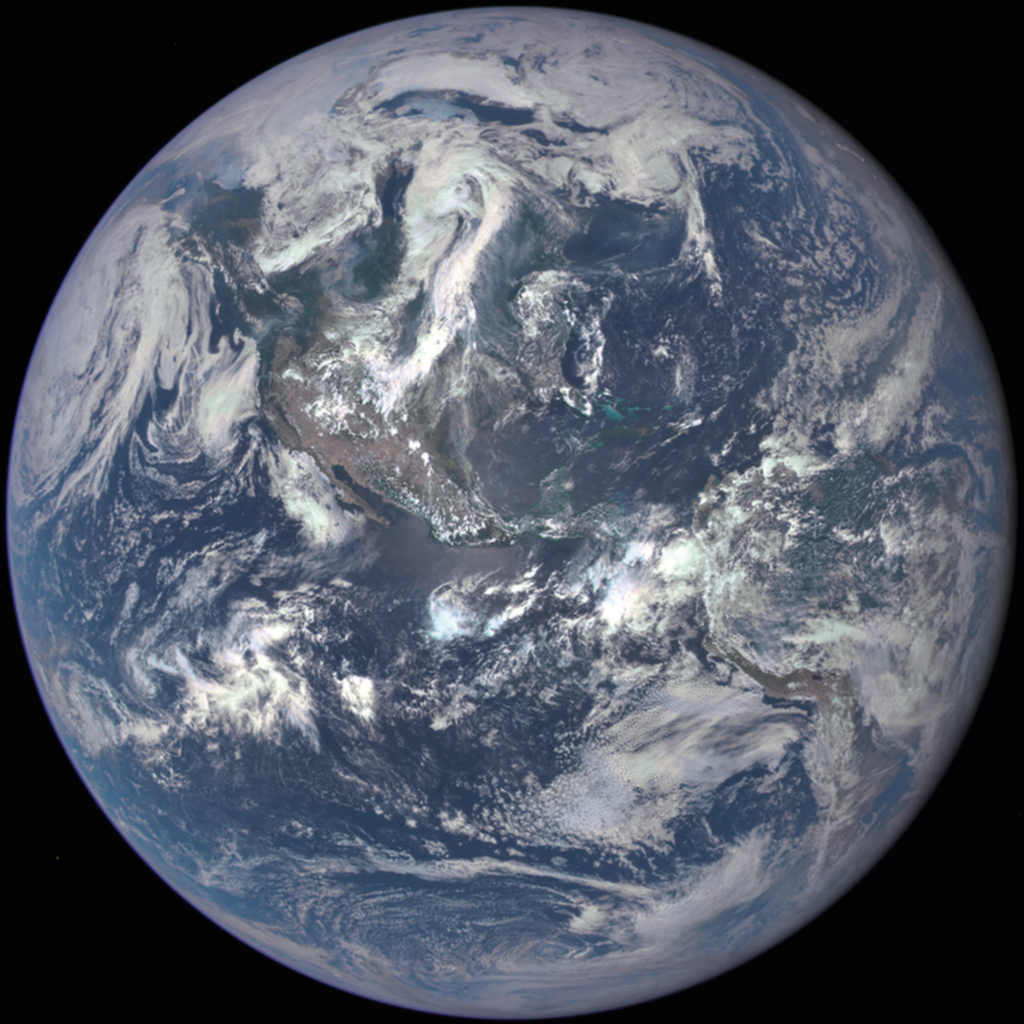
In this regard, financial institutions and companies should note the following matters:

- Set priorities differently from the past in responding to climate change.
- Start with referring to TCFD's recommendations prepared by experienced global gurus.
  (However, such recommendations should be customized depending on where the company is located (country/region), its business category and features.)
- Establish governance, strategy, risk management and targets in the long term and clarify the roles and responsibilities of the board of directors and management at the corporate levels, rather than entrusting such work to individual departments.
- Establish roles and responsibility of responsible departments and internal countermeasure processes.
- Secure a continuous management system by connecting achievements to a proper compensation system.
- Provide consistent training to employers/employees to improve their awareness of climate change including changes in external environments/demands of interested parties.

If companies and financial institutions leverage the above takeaways in communicating with their key stakeholders, including shareholders by customizing them to their own circumstances and reporting the result thereof to the board of directors (proactive disclosures through the sustainability report and other diverse initiatives), this will not only help them manage their corporate value but also turn risks to opportunities.

REFERENCES

1. AIGCC, "The Investor Agenda Fact Sheet (V2)", 2018. 9.
2. Bank of Korea, Climate Change and Financial Risks Report, 2018. 6. 28
3. Carbon Tracker, The $2 trillion stranded assets danger zone: How fossil fuel firms risk destroying investor returns, 2018. 11. 24.
4. Climate Disclosure Standards Board & Carbon Disclosure Project, Are Companies Prepared for the TCFD recommendations?, 2018. 3.
5. Financial News (Korea), "Global Heat Wave and Soaring Wheat Prices, 2018. 8. 5
6. Financial Times, "ING to assess $600bn loan portfolio based on climate impact", 2018. 9. 17,
7. Financial Times, "Royal Dutch Shell threatened with climate change legal action," 2018. 4. 4
8. ING, "ING will steer portfolio towards two-degree goal to help combat climate change," 2018. 9. 14
9. IPCC, Summary for Policymakers, 2018. 10. 8
10. Joongang Ilbo, "Dáil Éireann of Island Approved "Fossil-Free Fuel" Legislation... For the First Time in the World," 2018. 7. 13
11. Korea Energy Economics Institute, Mid- to long-term development strategies for the Korean oil industry following changes in the structure of the global oil market (2nd year), 2017. 12. 31
12. Korea Environment Institute, Countermeasures to the loss and damage following the adverse impacts of climate change, 2017. 12. 31
13. Maeil Business Newspaper, "KRW 3 Trillion for 'Reducing Greenhouse Gas,' Striking Power Generation Service Providers" 2018. 7. 24
14. National Institute of Meteorological Sciences, Centennial Climate Change on the Korean Peninsula, 2018. 8. 16
15. New York Times, "Ireland Moves to Divest From Fossil Fuels", 2018. 7. 12
16. RE100, Approaching a tipping point: How corporate users are redefining global electricity markets, 2018. 1.
17. Task Force on Climate-related Financial Disclosures, Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures, 2017. 6. 29, Amended 2017. 12. 15
18. Task Force on Climate-related Financial Disclosures, Recommendations of the Task Force on Climate-related Financial Disclosures, 2017. 6. 29
19. Task Force on Climate-related Financial Disclosures, The Use of Scenario Analysis in Disclosure of Climate-related Risks and Opportunities, 2017. 6. 29
20. Wall Street Journal, "Global Heat Wave Toasts Wheat and Prices Soar," 2018. 8. 4;
21. World Bank Group, State and Trends of Carbon Pricing 2018, 2018. 5.



Together Possible

WHAT DOES TCFD MEAN FOR KOREAN COMPANIES?

USD 82 billion

2018's annual value of CO2 emissions allowances subject to ETS or carbon tax

-19.4%

Financial impact by materials and buildings industry (reduction rate)

USD 32 trillion

Investors managing assets worth USD 32 trillion have expressed their intent to participate in "The Investment Agenda"

-35.3%

Financial impact by energy industry (reduction rate)

Citi Foundation

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Why we are here
To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

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