Guidance for Adaptation Finance (Proposal)

<Summary>

・This Guidance proposes to set up a three-step framework for adaptation finance to utilize private finance for adaptation activities due to climate change.

・The first step should be to establish a 'taxonomy of projects' for adaptation activities that will be the destination of adaptation funds, and to clarify the utilization of proceeds of the finance.

・The second step should be to establish a 'taxonomy of methods' to demonstrate the 'method' to be used to estimate the future 'expected cash flow' from the target adaptation projects.

・In the third step, in order to 'make visible' the 'expected cash flows' estimated in the second step for financial institutions and investors, the issuers of adaptation finance instruments shall create 'proxy cash flows' that are linked to such estimated expected cash flows and convert their value into present value for provision to financial institutions and investors. Such issuers are preferably public bodies (national governments, local governments, etc.) or those who cooperate with public bodies.

・This framework consisting of a three-step process should be called a new 'blended finance scheme' in public-private partnerships. To enhance the overall reliability of the framework, transparent pre-project planning verification by a third party, and continuous monitoring of post-project operations should be required.

＜Introduction＞

Climate change measures are basically divided into: mitigation measures for stabilizing greenhouse gas (GHG) concentrations by reducing emissions of GHGs such as carbon dioxide (CO_2) that accelerate climate change, and adaptation measures for curbing and reducing the physical impacts of climate change materialization. From these, mitigation measures mainly include clean energy projects that convert energy sources from fossil fuel resources to renewable energy, energy conservation projects that increase the efficiency of energy use, carbon sink projects,

etc. Although the inflow of funds from private financial markets to the green and clean projects market, which is in the business of addressing these measures, is not yet sufficient, it is increasing year by year.

On the other hand, adaptation measures include a wide range of areas, such as flood control and landslide control measures against increased natural disasters, forest fire prevention measures, enhancement of seawalls and other measures against rising sea levels and coastal erosion, breeding of agricultural products resistant to global warming, insurance and health measures for disaster victims, development of meteorological observation, monitoring, and early warning systems for early detection of climate-related disasters, and securing and providing resources including water. All of these are measures against the physical risks[1]pointed out by the Task Force on Climate-related Financial Disclosures (TCFD) of the Financial Stability Board (FSB). However, it is hard to say that adaptation measures for evaluating and reducing these risks, and for decreasing loss and damage, are sufficiently being implemented at present as compared to mitigation measures.

Awareness regarding the necessity of financing adaptation measures to respond to the effects of climate change is increasing globally, especially in developing countries that are prone to these impacts. One example of such awareness materializing is the 'Loss & Damage' issue[2], which was a focal point at the 27th Conference of the Parties (COP27) to the United Nations Framework Convention on Climate Change held in 2022. Behind this is the burgeoning structure of a vicious cycle, where inadequate financing for adaptation activities results in increasing loss and damage for both affected people and society, leading to an inability to sufficiently respond to the escalating burden, which in turn further materializes and amplifies physical risks.

Regarding financing for mitigation activities, although it is still insufficient to achieve net-zero emissions, policy supports such as feed-in tariff systems (FIT) for encouraging renewable energy and public subsidies or tax deductions for electric vehicles (EV) are being implemented in various countries. These measures are channeling private financial market funds into such mitigation activities. However, despite growing recognition of the necessity and urgency of adaptation measures, a significant reason why sufficient funds are not being allocated to this area is the lack of policy mechanisms to guide private financial market funds, unlike the case of mitigation measures. Fundamentally, current adaptation measures rely heavily on public spending by national and local governments, and a major issue is the inability to secure necessary funds from private financial markets.

One factor hindering sufficient public-private collaboration in adaptation activities is the difference in the perceived cash flows generated by target projects between mitigation and adaptation activities. For mitigation activities, such as clean energy initiatives that are the target of policy support like the FIT mentioned earlier, a steady cash flow can be expected from the revenue owing to the electricity generated by the project supported by the policy. In addition, prospects exist for corporate climate risk management businesses and for climate opportunity initiatives associated with mitigation activities. Commercialization in these areas is already well underway. In terms of raising funds from private markets, for mitigation activities, the market for raising funds through ESG bonds, such as green bonds, is expanding.

Similarly, if adaptation activities could expect to raise a certain amount of cash flow, the commercialization of such activities should advance, and funds from financial markets should flow in. However, unlike green projects related to mitigation activities, the cash flow expected from adaptation activities comes from the reduction of physical costs expected after project completion, making it difficult to estimate such future expected cash flows at the project planning stage or even during the construction period. Therefore, the majority of current adaptation measures are infrastructure projects for public benefit, aimed more at preemptively reducing loss and damage that could occur with climate change rather than generating future expected cash flows.

As a result, current adaptation measures have so far primarily been public projects by central governments and local authorities, with financing from private financial institutions limited mainly to supplementing expenditures by the public sector and providing 'bridging funds' until public funds are available. It can be said that private adaptation finance, predicated on the expected cash flows to be generated from future adaptation activities, is rarely anticipated. In other words, since current adaptation finance remains within the scope of public systems and expenditures, it is subject to fiscal constraints of countries and local governments, leaving the funding gap for adaptation activities unbridged.

To overcome these functional deficiencies of current adaptation finance and provide appropriate funds for the growing demand for adaptation activities, a mechanism that allows private financial institutions and investors to make investment and financing decisions based on the expected cash flows from adaptation activities needs to be introduced. It is crucial to create a mechanism that can generate new cash flows in adaptation activities, just as in mitigation activities.

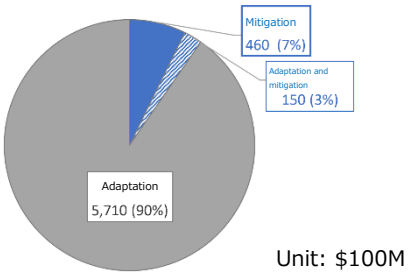
While it is desirable that the advancement of mitigation activities allows us to envision a 'decarbonized' future, we must also prepare for an 'undesirable scenario' where our level of achievement in addressing climate change remains insufficient, taking into account the current political and economic situations of various countries, the pace of technological development and innovation, dependence on traditional energy systems, and differences in people's sense of crisis. In such a scenario, there is a risk that we would not be able to halt the increase in climate disasters, but rather, they would accelerate, and we would not be able to curb the increase in 'loss and damage.' Therefore, establishing a functional 'adaptation finance' is an urgent task for all societies.

This Guidance proposes new 'adaptation finance' steps to create 'expected cash flows' from global private financial markets into adaptation activities and realize 'proxy cash flows' linked to these expected cash flows, in order to untangle the financial challenges faced by current adaptation activities.

<Current Status and Gap in Adaptation Finance>

There are multiple data sets on the scale of climate finance. According to the annual report[3] published by the Climate Policy Initiative (CPI), a US non-profit think tank, the amount of global climate finance in 2021 was $632 billion (approximately 87.34 trillion yen). Of this, 90% or $571 billion went to mitigation activities, with only 7.3% or $46 billion flowing into adaptation activities (the remaining $15 billion was used for both purposes).

Figure 1. Proportion of mitigation and adaptation activities in climate finance



(Note) CPI 'Global Landscape of Climate Finance 2021'

The United Nations Environment Programme's (UNEP) 'Adaptation Finance Gap Report' estimates that annual sums of $160 billion to $340 billion will be required for adaptation activities by 2030, and $565 billion annually by 2050[4]. However, with the current level of adaptation finance at $28.6 billion (2020), the adaptation finance gap

is estimated to widen 5.6 to 12 times by 2030 when examined with the current flow of funding. Although there are differences in the estimation of current adaptation finance amounts between the CPI and UNEP data, considering the desired scale of funding, balance with mitigation finance, and other factors, it is estimated that at least 10 times the current funds are needed for adaptation activities. The funding gap will further widen by 2050, expanding to almost 20 times.

In addition to the size of the funding gap, as can be seen next, most of the funding sources supporting current adaptation finance are dominated by international public financial institutions and public funds from national governments and municipalities, accounting for about 80% of the total, while funds from private financial markets are barely mobilized. The flow of funds for adaptation activities is far from the blended finance of public-private partnerships. From this current situation, it is clear that in order to enhance the agility and scale of adaptation finance, developing a new mechanism is needed to estimate expected cash flows from such activities, which can serve as a benchmark when private funds finance adaptation activities.

<Application of Public Finance to Adaptation Activities and Its Potential>

Both domestically and internationally, the majority of current adaptation finance is centered on funds from the public sector, such as national and local governments, as well as public financial institutions, and the possibility of developing public-private partnerships as blended finance is limited. What can be inferred from this situation is that while the use of public policies and public funds seems necessary for the expansion of adaptation activities, it seems unlikely that the traditional mechanisms of blended finance could cope.

Currently, in adaptation activities being implemented in developed countries, public funds from national and local governments serve as key resources for financing such activities. The role of private funds is limited to a supplementary role, such as for 'bridging' until public funds become available for use. Meanwhile, in the case of investments and loans for adaptation activities related to infrastructure in developing countries, international financial institutions and the public sector of developed countries provide concessional finance, setting long-term loan periods and offering low interest rates according to the repayment capacity of the developing countries. When private financial institutions participate in financing, public institutions often provide public guarantees to allow for low-risk investments and loans, in addition to providing loss absorption and risk-sharing mechanisms.

In the context of new public-private collaboration in adaptation finance, if the state or public sector does not limit its risk sharing to the current risks associated with the target adaptation project, but rather covers the creation of future expected cash flows from the project through guarantees, loss absorption, risk-sharing mechanisms, and the like, private financial institutions and investors may be able to foresee the profitability of investments and loans for adaptation activities.

<Concept of 'New Blended Finance' for Adaptation Activities>

It is considered that the application of blended finance from new public-private partnerships to adaptation finance can be largely divided into two. One scenario is when private entities and private financial institutions participate in adaptation activities which are primarily led by public institutions as has been traditionally done. In this case, funds (public funds) could be allocated based on cost sharing between the public and private sector, considering both future risks and opportunities. The other scenario is when public mechanisms are provided to invigorate adaptation activities led by the private sector. In such a case, public mechanisms could be introduced to secure the expected cash flow from the investment (private funds) put into the target adaptation project.

This Guidance aims to design the latter mechanism. On the whole, it is expected that cases where public institutions take the lead when it comes to adaptation activities will continue to be the norm. Whether the number of adaptation projects based on private funds will increase depends on the functionality of the public system introduced to guarantee the creation of expected cash flows from adaptation activities. The introduction of a public system to attract private funding for adaptation activities themselves is considered to be a support measure for the private sector, equivalent to public support such as the FIT system, subsidies, and tax reductions for mitigation activities, and not different from other public policies. Rather, the public policies proposed in this Guidance are thought to entail fundamentally less fiscal burden than subsidies or tax reductions, while potentially increasing the flow of private market funds more than ever before; therefore, their economic rationality should be considered high and justifiable.

The expected cash flows that are projected to be generated from adaptation activities include the additional economic value derived from the revitalization of economic activities and stabilization of social life in the target regions due to increased safety, convenience, and so forth, after the completion of adaptation projects, and the resulting increase in asset values of real estate, among other things.

The estimation of such expected cash flows is undeniably beneficial in the investment and lending decisions of private financial institutions and investors. However, it may not be sufficient to rely solely on the estimation of expected cash flows for financial institutions and investors to actively engage in financing future adaptation activities. The 'expectation' of expected cash flows may fluctuate due to trends in transition risks associated with climate risks, as well as physical risks specific to target adaptation projects.

Therefore, in order to make the 'expected cash flows' more reliable and 'visible' for financial institutions and investors, we propose the establishment of a 'proxy cash flow' linked to expected cash flows as a key tool for a new blended finance framework by public institutions. The envisaged adaptation finance consists of a three-step process: first, selecting adaptation activities that can be applicable to the 'taxonomy of projects'; next, choosing 'methods' that can foresee the creation of expected cash flows in the future from these adaptation projects; and thirdly, demonstrating the 'proxy cash flow' linked to these expected cash flows from the projects to financial institutions and investors to 'make visible' such 'expectations.'

<Scope and Challenges of Adaptation Finance>

Next, the target scope and the challenges of adaptation finance, which underpin this phased adaptation finance framework based on new public-private partnership initiatives, will be explained. The scope of adaptation activities is extensive, as provided in the taxonomy of adaptation projects shown in the next section of the Guidance.

Increasing climate change-driven natural disasters, changes in agricultural and fishery harvests, changes in consumption behavior, changes in business activities, and changes in people's daily lives also require adaptation to climate change. The concept of time applies to adaptation activities as well. This includes precautionary measures before disasters occur, how to enhance the ability to deploy rapid emergency responses during disasters, and post-incident measures for prompting recovery operations and follow-up measures to prevent recurrence with such emergencies.

The range of target projects is also expanding. This includes the development of varieties and cultivation methods resilient to climate change in the case of crops, as well as business creation to address the change in consumer needs brought about by the transition to a 'decarbonized economy and society' and the development of new

adaptation needs in businesses. It also encompasses the deployment of Business Continuity Management (BCM) and the like to ensure the continuation of business activities even under climate change-driven natural disasters.

In the case of infrastructure enhancement projects, measures include not only preparing for anticipated natural disasters in advance, but also upgrading reconstruction activities following a disaster to more 'resilient infrastructure' that exceeds the scale of conventional ones, or 'high-quality infrastructure[5]' that considers lifecycle costs, environmental and societal aspects, and risks of natural disasters. Such upgrades will aid in the prevention of future recurrences and contribute to the enhancement of the overall functions of the economy and society. By strengthening these adaptation activities, it is possible to address the physical risks during the period until the effectiveness of mitigation policies prevail. In doing so, the escalation of 'loss and damage' can be suppressed, and the enhancement of the functions of economic and societal infrastructures is also anticipated.

Hence, the demand for adaptation activities is inherently large. There are even estimates suggesting that the market for adaptation activities could reach an annual scale of $2 trillion by 2025. However, the reason why a large gap exists in the current situation, as mentioned earlier, is due to the fact that the 'expected cash flow' that can be anticipated from adaptation projects such as infrastructure enhancement or crop conversion, is ambiguous and elusive at the planning and implementation stages of the project. Such ambiguousness and elusiveness lead to dependency on public funds as before, rather attracting financing from private markets.

In contrast, as already pointed out for mitigation activities, the introduction of mechanisms like the FIT for renewable energy power, which guarantees a certain amount of income (cash flow) from the sale of renewable energy to operators for a fixed period, has provided predictability for renewable energy business operators, thereby stimulating their enthusiasm for further technological development and business expansion. In response to such initiatives by these business operators, private financial institutions and investors have also been increasing their financing for the same as new investment opportunities.

Based on these 'success stories' of mitigation activities, it should be possible to estimate the total expected cash flow of an adaptation project as well by considering the increase in the amount of physical risk loss avoidance due to the implementation of adaptation measures as an 'effect of the investment[6].' For the evaluation metrics of the effects of such measures, in the case of mitigation activities, the reduction in CO_2 is represented through a quantity called 't-CO_2eq (tons of CO_2 equivalent),' and

financing is allocated to the reduction cost. Meanwhile, for adaptation activities, it is conceivable to use the 'monetary value' of the estimated loss avoidance amount itself as the evaluation metric.

Furthermore, while mitigation activities are implemented on an individual project basis such as for renewable energy or energy conservation, in the case of adaptation activities, the impact range of improvement effects, such as the development of economic goods resistant to climate change, can be said to be broader than mitigation measures, contributing to the reduction of disaster occurrence and damage in the entire regional community through the development of regional infrastructure, among others. By implementing the optimal adaptation measures to curb 'loss and damage' across the entire regional community, it is expected that time can be secured for the transition to a decarbonized society through the enhancement of mitigation measures.

In the case of agriculture farming, adaptation activities such as the development of climate-resilient varieties and crop conversion can be considered. During its transition period, if the anticipated crop conversion effects can be achieved, new revenue for farmers can be expected. The implementation of a company's BCM can contribute to the enhancement of the target business entity's income if it not only reduces disaster risks but also improves overall business efficiency. If the future improvement effects anticipated after these adaptation projects are completed can be pre-estimated as 'expected cash flow' at the time of adaptation financing, it may promote the introduction of market funds into adaptation activities as a whole.

<Taxonomy of Adaptation Projects>

The development of a taxonomy of adaptation projects, which clearly indicates the target project in advance, is effective in promoting sustainable finance. The EU has prepared project taxonomies for mitigation and adaptation projects as the core of its sustainable finance strategy. Financial institutions and investors can evaluate the sustainability of target projects if they can confirm whether the mitigation or adaptation project in question is listed in the taxonomy.

The 'Transition Finance Study Group in Japan (TFSG),' hosted by the Research Institute for Environmental Finance (RIEF), has published a guidance entitled 'Transition Finance,' which sets a 'Transition Taxonomy' that lists high carbon-emitting entities and projects that should be targeted in the transition field[7].

Following these precedents, it is effective to establish a new taxonomy that clarifies a target project for adaptation finance as well. In addition to distinguishing adaptation

projects from new infrastructure projects, it is also conceivable to evaluate the additionality of adaptation responses for the evaluation of overlaying adaptation features on new infrastructure by conforming with the taxonomy.

The EU has set adaptation taxonomies for 13 sectors including forestry, environmental protection and recovery activities, and manufacturing in its sustainable finance taxonomy. In the EU's case, each business entity shows the classification when it is involved in adaptation activities. Also, in the same taxonomy, the 'Do No Significant Harm (DNSH)' principle is set as a common condition for all adaptation activities.

The DNSH principle is not only to enhance the effects of adaptation but also to avoid negative impacts on other environmental areas such as environmental pollution, the destruction of nature, and ecosystem conservation. This principle should also be a requirement in the taxonomy of adaptation projects in this Guidance. Furthermore, while improvements to infrastructure and the like due to adaptation activities can benefit local communities, measures should be included to ensure compliance with the minimum safeguards to be maintained in the social aspect, as adopted by the EU, so that the deployment of adaptation activities does not impose any burden on the vulnerable in local communities, or lead to cases lacking in equity.

Here are some of the items in the 'taxonomy of adaptation projects' envisioned at this time.

Figure 2. Main envisioned items in the taxonomy of adaptation projects[8].

<Step 1> Identification of Adaptation Projects

(listed in no specific order, non-exhaustive list)

Field	Impacts of Physical Risks	Adaptation Project
Agriculture, Forestry, Fisheries	Decline in the quality of rice due to high temperatures	Introduction of heat-resistant varieties
Water Environment and Resources	Decline in groundwater level during the irrigation period	Promotion of groundwater management
Natural Ecosystems	Possibility of the disappearance of coral reef growth areas	Conservation of coral reef ecosystems with high adaptability

Natural Disasters and Coastal Areas	**Increase in heavy rains causing floods**	**Promotion of 'basin flood control'**
	Increase in the frequency of debris flows and similar incidents	**Installation of erosion control dams, etc.**
Health	**Increase in the risk of death from heatstroke**	**Dissemination of preventive information to the elderly**
	Change in the risk of various infectious diseases	**Collection of knowledge on the impacts of climate change**
Industry and Economic Activities	**Impacts on security**	**Promotion of measures from the perspective of minimizing impacts**
National and Urban Life	**Disruption of lifelines such as transportation, electricity, gas, and water due to heavy rain**	**Formulation of a crisis management manual**

<Step 2> Implementation of Screening

(common conditions)

DNSH Principle	Minimum Safeguards
Confirm the absence of risk of significant loss for the following five items: **1. Climate Change Mitigation** **2. Water and Marine Resources** **3. Circular Economy** **4. Pollution Prevention** **5. Biodiversity**	**Confirm whether or not the project has a negative impact on the following social issues:** **(Examples) Human rights, diversity, etc.**

<Taxonomy of Expected Cash Flow Generation Methods>

If the implementation of an adaptation project makes it possible to appropriately evaluate the reduction amount of future physical losses, it becomes possible to estimate the expected cash flow from the adaptation project. However, compared to mitigation activities where revenues can be evaluated at the planning stage, in

adaptation activities that evaluate cost or risk reductions after project completion, methods to estimate expected cash flows have not been sufficiently developed. Therefore, alongside the development of a 'taxonomy of projects,' we will establish a 'taxonomy of methods' that lists various ways to generate 'expected cash flows' from adaptation activities. The 'taxonomy of methods' is intended to enumerate methods that contribute to generating expected cash flows from adaptation activities, by referencing some initiatives and mechanisms that have already been implemented in fields other than adaptation activities. Below is an overview of each method:

Figure 3. 'Taxonomy of methods' for generating expected cash flows

(listed in no specific order, non-exhaustive list)

・Negative cost method
・Present value of 'future adaptation value'
・Application of the 'asset retirement obligation (ARO)' concept
・ Vaccine bond method
・ Issuance of adaptation bonds
・ Adaptation scoring system
・ Adaptation credits
・ Catastrophe (cat) bonds
★Utilization of insurance
★MRV methods

(Note) ★ indicates common items.

▼Considering negative costs as cash flow

As previously mentioned, if the 'avoidance of physical risks by implementing adaptation measures is considered an "effect of investment,"' it can reduce the overall cost of the project in the long term and lead to an expansion of the project's earnings. In mitigation activities such as energy-saving projects, if utility expenses are reduced relative to past expenses by investing in new equipment for utility cost reduction measures, the amount saved can be counted as earnings for the business entity. Energy Service Companies (ESCOs) are known as business entities that consider such cost reductions (negative costs) as cash flow.

There are also several precedents in the West for mechanisms that turn cash flow from negative costs into financial products. One such example is the Property Assessed Clean Energy (PACE) program in the United States[9]. This program was

introduced in 2001 in cities like San Francisco as an energy-saving method for existing residences. This is a program where the initial costs to be incurred when making energy-saving investments in existing homes, such as introducing solar power or installing double-glazing and insulation, are not borne by the homeowners, but are provided to the housing asset through policies of the local government. After the value of the house increases due to these energy-saving modifications, the renovation costs are offset through an increase in property taxes over a certain period. The cash flow for PACE bonds (municipal bonds) issued by local governments to finance such projects is allocated from the pooled property tax revenues from these houses. As a result, the cash flow from the negative costs is allocated to the bond interest payments.

A similar mechanism is the 'Green Deal plan' introduced by the UK in 2013[10]. This is also a system to promote energy-saving in existing homes. Homeowners can reduce the equipment costs for making their homes more energy-efficient to essentially zero by leveraging the 'negative cost' effect of reduced utility expenses. While the amount of payment for utility costs in the energy-efficient renovated homes remains the same as before, there is a reduction in actual utility costs due to the improvements, and such difference between the amount of payment and actual utility costs is allocated to the repayment of the principal and interest on the loan borrowed from the financial institution. This way, the burden of initial investment can be alleviated.

All these examples involve energy-efficient homes. However, if these methods are applied to adaptation activities and the reduction in future physical risks resulting from those activities can be evaluated as 'negative costs,' it may be possible to estimate the expected cash flow associated with adaptation finance.

▼Present value of 'future adaptation effects'

Adaptation projects such as the addition of levees or the modification of rivers reduce physical damage during disasters. Decreasing disaster damage, including human suffering, lowers the overall cost to society. Also, for entities operating in the region, it becomes possible to contribute to income by reducing the overall project costs through the decrease in disaster costs. This reduction is achieved by addressing concerns about operational shutdowns resulting from flood damage to factories and roads, harm to employees, and disruption of logistics among business partners. For residents living in the region, there is also a possibility of a reduced insurance premium burden and an increase in the value of assets such as their homes.

If such reductions in future costs to society as a whole or improvements in asset value brought about by adaptation activities can be considered as a proxy for

'expected cash flows' from the adaptation activities and reflected in the future earnings of entities in the region and the valuation of personal assets, it becomes possible to regard increases in land tax revenue based on the estimation of future 'negative costs' at the project/asset level, or reductions in insurance costs, as expected cash flows.

▼Application of the asset retirement obligation (ARO) concept

In the current evaluation of corporate financial accounting, there is also a similar mechanism, that is, the concept of asset retirement obligation (ARO)[11]. Assets such as factories and equipment owned by entities must also be disposed of or renewed in the future. During this process, normal removal methods may not be sufficient to address the presence of hazardous substances or other contaminants in these assets, requiring additional costs for their safe disposal. The cash flows (in this case, cash outflows) arising from these future additional obligations caused by environmental factors are referred to as asset retirement obligations.

In accounting for asset retirement obligations, the present value of 'future costs' is recorded both as a liability (asset retirement obligation) and as an asset (acquisition cost), and the capitalized retirement cost (corresponding to the asset retirement obligation) is allocated as amortization expenses for each term over the remaining useful life of the tangible fixed asset in question based on the contribution to the cash inflow of the business as a whole while disclosing the total cost information in the financial statements earlier. However, in accounting treatment, it is not allowed to recognize 'future cash flows' earlier, unlike asset retirement obligations.

Meanwhile, in an adaptation project plan, if it is possible to estimate the future 'expected cash inflows' based on the anticipated reduction amount in physical risk losses associated with the project, there is a possibility that it could be considered as a financing target for private financial institutions, separate from accounting treatment. Regarding the actual generation of future 'expected cash flows,' like the negative cost method described above, it is considered that a method in which such is regarded as 'prepayment' for future tax revenues by local governments, or as a 'proxy' that links 'future budget expenditures' of local governments to the expected cash flow, may be conceivable.

▼Vaccine bond method

It is also possible to consider the use of the 'vaccine bond method,' a mechanism in which private funds are used to finance future contributions from public funds in

advance. Vaccine bonds are bonds issued by the International Finance Facility for Immunisation (IFFIm). The IFFIm invests funds for the proliferation of vaccines and the enhancement of healthcare systems in developing countries, using donations from major countries as the original capital. To compensate for the 'time gap' between the donation period and the application of the vaccine, it employs a scheme of issuing bonds in the middle and procuring necessary funds from private markets in advance.

Applying this scheme to adaptation finance allows for the procurement of long-term future adaptation finance funds from private markets by issuing 'adaptation bonds' and the like. In the case of vaccine bonds, the expected cash flow in the future is donations from various countries, etc. over the long term. However, in the case of adaptation finance, it will be the future budget amounts of national and local governments, and in countries with an annual budgeting system, it will be necessary to introduce a 'future fiscal year burden system.' It is also possible for the Japanese government to include adaptation activities as a destination for funds when issuing economic transition bonds (GX bonds) under the 'Green Transformation (GX)' policy. Grants from private foundations and others can also be utilized as source capital.

▼Issuance of adaptation bonds (government bonds)

As mentioned above, while there is an option to add adaptation activities to the fund usage of GX bonds, if emphasis is placed on clarifying the use of funds, it would be easier for private financial institutions and investors to accept the issuance of government bonds focused on adaptation activities. Just like the construction bonds that the Japanese government used to issue for financing the construction of infrastructure such as railways and roads, it is conceivable to issue 'adaptation bonds,' so-called 'Tokurei kokusai' which are deficit-financing bonds under special legislation, to fund projects of public interest that enhance the climate adaptability of national and societal infrastructures as a whole and contribute to a decarbonized society.

In Japan, there are a number of local governments including the Tokyo Metropolitan Government who have already issued public green bonds, the proceeds of which go to adaptation projects such as river renovations, landslide responses, and flood prevention measures in their respective regions. Internationally, the European Bank for Reconstruction and Development (EBRD) issues its own 'climate resilience bonds.' The issuance of social impact bonds (SIBs) can also be considered, which would include grants from private foundations and others in addition to public institutions, as a source of funds for the expected cash flow for adaptation projects.

▼Adaptation scoring system

To increase the certainty of generating expected cash flows from adaptation activities, a method of evaluating the primary areas of the target adaptation projects using a scoring system can be considered. For example, for adaptation projects, by using scores provided by external evaluation agencies based on the four items of the 'TCFD' recommendations (governance, strategy, risk management, and metrics and targets), financial institutions and investors can evaluate the reliability of a target project with a certain level of objectivity. External agencies providing such scores need to ensure their credibility through registration with financial regulatory agencies and the like.

▼Utilization of insurance

When incorporating the generation of future expected cash flows into adaptation finance, the use of insurance becomes crucial in ensuring the stability of these cash flows. Insurance companies themselves are also facing climate challenges with an increase in payment of insurance claims due to the increase in natural disasters. As adaptation activities are implemented broadly, disaster risks, crop failure risks, and the like may decrease or stabilize, thereby creating appropriate demand for insurance contracts. Concurrently, insurance companies will be able to provide insurance related to disaster risks more stably. Moreover, if insurance companies provide new insurance that secures the expected cash flow of adaptation finance, the effect of ensuring stability in investments and loans for adaptation activities can be expected. Since it is believed that insurance can contribute to the reduction of risk in expected cash flows when utilized in conjunction with other adaptation finance methods, it can be positioned as a common method applicable to the entire field of adaptation finance.

As an insurance mechanism that guarantees the generation of expected cash flows in large-scale infrastructure renovation projects and the like, a public-private partnership structure like the earthquake insurance scheme in Japan can also be envisaged. For adaptation measures at the regional and community levels, in addition to raising project funds through microfinance, enhancing credit through microinsurance can also be effective. It is desirable to be able to choose from a variety of insurance tools in the market, such as public-private partnership insurance, private insurance, and microinsurance, depending on the scale and scope of the adaptation project.

▼Catastrophe (cat) bonds

Given the increasing number of cases where insurance functions alone cannot fully cover natural disaster risks, the use of catastrophe (cat) bonds, which connect insurance markets with capital markets and target large-scale disasters, is expanding. These bonds are issued in capital markets as a risk coverage mechanism that goes beyond risk sharing through reinsurance. While the use of these bonds is primarily led by private entities, in places like the EU, there are discussions to issue cat bonds in collaboration between public bodies and private insurers, incorporating them into adaptation measures[12]. If a disaster does not occur under certain conditions of cat bond contracts, the bond issuer is required to pay a high interest to the investors investing in such bonds. Their usage is limited due to the high-cost burden of these payment conditions. Thus, it is conceivable to secure funding for adaptation activities such as emergency recovery operations following severe climate disasters by promoting public-private partnerships to reduce costs. In the applicable regions of such bonds, an increase in external and other forms of investment is also expected.

▼Adaptation credits

The utilization of credit functions is also worth considering. In mitigation activities, in addition to emissions trading based on the Kyoto Protocol, the international utilization of carbon credits based on Article 6 of the Paris Agreement is also progressing. The 'Core Carbon Principles (CCPs)[13]' published by a private-led international organization includes voluntary carbon credits (VCM) as one of the components, which entails voluntarily allocating 5% of credit revenue to the United Nations' Adaptation Fund under the UNFCCC.

In this case, although it is a mechanism to allocate a portion of the credits created from mitigation activities to adaptation activities, it is also possible to evaluate and verify the 'expected cash flow' that can be anticipated to be generated by each target adaptation project in the future using the 'taxonomy of methods,' and to recognize the creation of cash flow linked to the 'proxy cash flow' seen in the next section as 'adaptation credits' or 'resilience credits.' During this process, there might be some fluctuations in the monetary measurement of future adaptation effects of the adaptation activities. However, an effect in which the present value of the expected cash flow will be indicated through the buying and selling of credits in the market can be expected.

▼MRV methods for adaptation finance

Another method, common to all adaptation finance strategies alongside insurance, is the introduction of Measurement, Reporting, and Verification (MRV) for adaptation activities. By clarifying MRV, it becomes possible to more accurately calculate the estimated amount of future damage, using quantitative assessments of physical risks that differ by entity and analyses of the degree of damage and probability of occurrence. If the estimated damage amount can be minimized by introducing adaptation projects, the negative cost generated therein can be presented as cash flow to financial institutions and investors. MRV forms the basis for the 'credibility' when estimating expected cash flows using multiple methods indicated in the 'taxonomy of methods' in this Guidance.

What is needed at that time is the development of common methods such as occurrence probability analysis for estimating expected cash flows generated by adaptation activities[14]. To compare the evaluation results of each entity engaged in adaptation activities, it is necessary to standardize the methods for quantifying physical risks developed by each entity, through theoretical verification and practical demonstration. By constructing an MRV system that corresponds to the taxonomy of methods for adaptation projects to be adopted, a common cost-effectiveness process is established, making it possible to maximize the adaptation effects of the adaptation projects and technologies introduced.

<Creating a 'Proxy Cash Flow' Linked to Expected Cash Flow>

When adopting the various adaptation methods listed in the taxonomy of methods, it is possible to utilize a single method or combine multiple methods. However, even if the use or combination of these methods is anticipated to generate expected cash flows, in reality, issuers should overcome the materialization risk in converting expected cash flows to actual cash flows for financial institutions and investors financing the adaptation activities concerned. Therefore, financial institutions and investors require an alternative method to 'discount' these potential cash flows to their present values when making financing decisions. As such, as a third step, we propose 'creating a proxy cash flow,' which can be implemented by public authorities or designers of climate finance.

For example, in the case of using negative costs in the taxonomy of methods, it is conceivable that countries or municipalities, whose disaster management costs will decrease due to the adaptation activities concerned, could budget an amount equivalent to the increase in expected cash flow corresponding to the future 'expected cost reduction.' They could then commit to, or assure, making payments as 'proxy

cash flow' to financial institutions or investors financing adaptation activities. The increase in expected tax revenues (urban planning tax, property tax, etc.) equivalent to the rise in asset valuations in the targeted regions due to disaster reduction by adaptation activities supported by private financing can also be budgeted, enabling 'proxying.' Similarly, the expected cash flow associated with a decrease in disaster insurance costs through public-private cooperation can also be 'proxied.'

In Japan, a system will be introduced where the insurance premium rate for individual comprehensive insurance changes by region according to the degree of disaster prevention measures[15]. If effective adaptation measures are implemented in those regions, it is conceivable that the reduction in insurance premiums in the relevant regions could be used as one of 'proxy cash flows' within the framework of new public-private partnerships. In the case of mechanisms like vaccine bonds, it can be said that future donations themselves from nations, local governments, and private foundations can also be treated as a kind of 'proxy cash flow.'

A proxy cash flow embodies the expected cash flow, so there is a need for the validity and reliability of the link between the two cash flows. In such a case, while the credibility of the public institution or the operator of the adaptation finance that provides the proxy is crucial, it is also necessary to maintain objectivity by introducing a mechanism where a third-party institution verifies the validity of the link.

The adaptation finance we propose here is a 'new blended finance' that has a three-step process. To summarize them again: the clarification of adaptation projects (taxonomy of projects), the selection of adaptation methods that generate expected cash flows (taxonomy of methods), and the creation of 'proxy cash flows' that 'visualize' the expected cash flows derived from these methods. It is thought that these mechanisms can be applied not only domestically in Japan, but also globally.

＜Verification and Monitoring＞

In order to increase the 'reliability' of adaptation finance, verification and monitoring by third-party organizations are essential. While the effects of adaptation projects are confirmed retrospectively after climate-related disasters occur, the verification process for adaptation finance can be divided into two: the pre-verification, which evaluates the validity of the adaptation project plan in advance, and the monitoring process, which checks whether the project can achieve the expected adaptation effects after the project is completed and being operated. From these, the monitoring

process also requires the verification of the present value of the expected cash flow. Therefore, the weight of the post-monitoring process becomes relatively more important as compared to the verification work of mitigation activities. In order to ensure the objectivity of both the verification and monitoring processes, verifying entities need to be placed under the supervision of financial regulatory authorities, and need to ensure a certain level of discipline and reliability when it comes to financial and personnel aspects, among others. Also, as verification including the validity of the institutional design of the adaptation project plan is expected to be required in the post-monitoring work, it is desirable that different third-party organizations handle the two tasks when possible.

＜Summary: Design of Adaptation Finance＞

This Guidance proposes a system design for constructing a 'new blended finance' centered on linking 'proxy cash flow' to 'make visible' the expected cash flow, by presenting two taxonomies: the 'taxonomy of adaptation projects' to become the subject of adaptation measures for introducing private funds into adaptation projects, and the 'taxonomy of methods' for generating expected cash flows from such projects. Public institutions, private entities (issuers), financial institutions (including underwriters), and others that undertake individual adaptation projects then select and combine methods suitable for generating expected cash flows according to the target adaptation project through such mechanisms and formulate adaptation finance plans.

As a procedure for designing individual projects, first, identify the physical risks of climate change in the target region. Next, evaluate and estimate the degree of impact of such physical risks over a certain period in the present and future, and calculate the estimated future loss/disaster amount. From these estimates, select the optimal method from the 'taxonomy of methods' to generate expected cash flows through cost reduction (or even negative costs) brought about by the newly introduced adaptation measure (a combination of multiple methods is also possible). Public institutions, private foundations, issuers, and system designers will then link a 'proxy cash flow' to 'realize' the expected cash flows that can be generated according to these procedures and present the same to financial institutions and investors. In order to minimize the gap between such 'expectation' and 'proxy,' the use of public finance

guarantees and assurances, private insurance functions, and others should also be considered within the framework of 'blended finance.'

In adaptation finance, financing methods change depending on whether adaptation projects are deployed for each specific physical risk factor, or whether such is for wide-area adaptation projects at the regional or national level. In addition to providing financing for adaptation activities by financial institutions, 'adaptation bonds,' which specify the use of funds as ESG bonds, and 'adaptation funds' that invest in research and development such as for crop harvest improvement are also anticipated.

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