

Good Practices for Financial Market Infrastructures (FMI)

Application of climate and environmental risks
into the risk management of an FMI

September 2023

DeNederlandscheBank

EUROSYSTEM

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Introduction

Climate change and environmental degradation can pose risks to Dutch financial market infrastructures (FMIs). These risks may result from physical damage due to climate change and environmental degradation or from financial institutions having to adapt to stricter climate and environmental policies, new technology and/or changing market sentiment. DNB expects FMIs to understand all material risks and to manage them appropriately. This also applies to climate and environmental risks. With these good practices, we provide non-binding guidance to manage these risks.

In its capacity as a prudential overseer of FMIs, De Nederlandsche Bank (DNB) encourages financial institutions such as FMIs to act proactively in response to climate and environmental risks depending on their risk profile and that of the broader ecosystem. The ecosystem includes market participants such as clearing members and banks that finance margin calls from clients such as pension schemes and insurance companies. FMIs are encouraged to move away from a reactive risk management approach to a more active approach, and to integrate climate and environmental risks in risk management practices before they manifest themselves as an actual event. The appropriate level of engagement depends on a specific FMI's risk profile.

The purpose of these good practices for Dutch FMIs is to offer non-binding guidance on how an FMI can organise its processes and procedures to manage climate and environmental risks. FMIs include central counterparties (CCP), central securities depositories (CSD), payment systems (PS), and securities settlement systems (SSS). This guidance can serve as a basis for internal and external dialogue with the ecosystem of an FMI. It could potentially become a baseline for the engagement of FMIs in this field. In managing these risks, an FMI can include its own activities and also the activities of its direct or indirect participants that form part of its ecosystem, as this is a circle of dependence,



but also of influence. We encourage FMIs to use these good practices as part of their risk management.

These good practices for FMIs have been drafted with reference to the Principles for Financial Market Infrastructures following consultations with Dutch FMIs and representatives from the Dutch FMI ecosystem. As part of the good practices, examples are provided in yellow boxes throughout the text. These good practices are intended to address the gap that exists for FMIs from the perspective of the central bank as the oversight authority for FMIs and a catalyst for encouraging sound risk management throughout the sector.

These good practices may be read in conjunction with the [DNB Guide to managing climate and environmental risks](#). This Guide relates to prudential supervision and is intended for insurers, pension funds, premium pension institutions, investment firms and institutions, as well as electronic money and payment institutions.

These good practices focus on the integration of climate and environmental risks in the risk management of an FMI as first pillar of engagement. Going beyond the good practices, an FMI could also consider how it can contribute to the transition to net zero emission by 2050. This may need to be done by an FMI in cooperation with its participants and other stakeholders. Therefore, the second pillar consists of active contribution via the FMI's innovation of products and services to support the transition. And finally, as a third pillar of engagement the FMI could examine its own environmental footprint. These three pillars are in alignment with calls for action and commitment around the 26th United Nations Climate Change Conference of the Parties organised in 2021 in Glasgow (COP26), for example by the [NGFS](#).

Legislative framework and applicability

Legislative framework for FMI's

The Principles for Financial Market Infrastructures (PFMI) are the international standards applicable to all systemically important payment systems, CSDs, SSSs, and CCPs. The existing EU legislation¹ applicable to FMIs follows the PFMI, e.g. CCPs and CSDs must have effective processes to identify, manage, monitor and report the risks to which they are or might be exposed.² In addition, FMIs which are clearing and settlement systems (*afwikkelondernemingen*)³ are obliged to have sound and ethical operational management, and are thus expected to manage material risks.⁴

The PFMI were issued in April 2012 by the Bank for International Settlements (BIS) Committee on Payments and Settlement Systems (CPSS) (now known as CPMI) together with the International Organization of Securities Commissions (IOSCO). At present, neither the PFMI, nor the Dutch or EU legislation explicitly mention or provide guidance on climate and environmental risks. Nevertheless, the requirements of the PFMI with regard to risk management form a good basis for the management of risks related to climate and the environment.

Application in oversight

With these good practices, DNB offers further guidance on the application of the existing PFMI with a view to the management of climate and environmental risks. The aim is not to create additional principles, but to provide guidance and inspiration to FMI management in dealing with climate and environmental risks in the broadest sense, based on the PFMI.

FMIs are free to take a different approach as long as they comply with applicable laws and regulations. The good practices are thus not binding but serve as input in the supervisory dialogue between the institution and DNB on climate and environmental risk management.

These good practices include practical examples of how climate and environmental risk can be integrated in the areas of governance, risk management and information provision (disclosure). These may be (anonymised) practical examples that we have observed at institutions, but can also be stylised examples. An institution can use these examples and apply them proportionately according to its nature, size and complexity and the materiality of the risks.

Whether climate and environmental risks are material to an FMI depends on the characteristics of its business model, operating environment and risk profile. At a minimum, we expect an FMI to analyse the extent to which climate and environmental risks are material to them. An FMI should identify these risks and assess their materiality. The FMI should then manage the material risks identified.

An FMI should adopt a proportionate and risk-based approach to managing climate and environmental risks that is geared to the size of the institution and the materiality of its exposure to climate and environmental risks. For example, a qualitative and less granular approach may suffice for a small FMI with low material exposures, whereas larger FMIs or FMIs with material exposures would

¹ The Systemically Important Payment Systems Regulation (SIPS) is EU Regulation for EU systemically important payment systems. The European Market Infrastructure Regulation (EMIR) is EU regulation for EU CCPs. The Central Securities Depositories Regulation (CSDR) is an EU regulation for EU CSDs operating securities settlement systems across the EU.

² Article 26(1) of the CSDR and Article 26(1) of the EMIR.

³ 'Afwikkelondernemingen' as defined in Section 1:1 of the Financial Supervision Act (*Wet op het financieel toezicht – Wft*).

⁴ Section 3:17 of the Financial Supervision Act.

adopt a more sophisticated approach. We recognise that climate and environmental risks have particular characteristics and that a gradual entry path may be necessary.

Going beyond what is needed from the perspective of risk management, we encourage FMIs to also contribute to the transition towards a sustainable economy with innovative products and services, and to reduce their own environmental footprint.



Climate and environmental risks

These good practices address climate and environmental risks. These are the financial and non-financial risks⁵ that may arise from an FMI's exposure to the effects of climate change and environmental degradation. Climate change can lead to extreme droughts, floods and storms, among other things. Examples of environmental degradation include water or air pollution, desertification, deforestation and loss of biodiversity and ecosystem services.⁶

Climate and environmental risks may be driven by **physical** and **transition risk** factors:

- Physical risk factors are related to the physical impacts of climate change and environmental degradation. These can be both acute and chronic. Acute physical risk factors result from extreme climate and environmental events, such as drought, floods or environmental disasters leading to soil, air or water pollution. Chronic physical risk factors result from long-term climate and environmental events, leading, for example, to sea level rise and biodiversity loss.
- Transition risk factors are related to the transition to a lower-carbon and greener economy, such as changes in climate and environmental policies and regulations, technology, or market sentiment.

Physical and transition risk factors are interrelated. The longer policy action and hence the transition to a lower-carbon and environmentally friendlier economy is delayed, the greater the (actual or expected) physical consequences will be. This may require more drastic policy measures. At the same time, far-reaching policy measures are a transition risk factor.

Physical and transition risk factors can lead to financial or non-financial risks for financial institutions, such as market and reputational risk, through so-called transmission channels (see Figure 1). These factors can have an impact on the economy and thus feed through to the financial system.

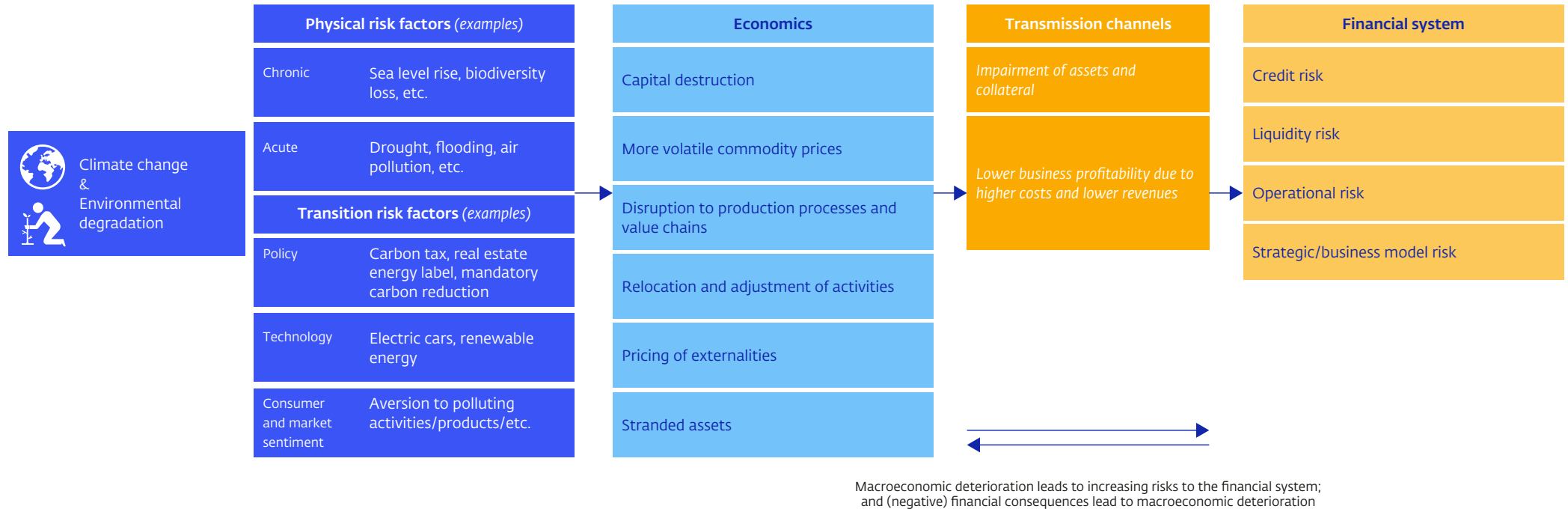
Physical and transition risks can also lead to systemic risks, which are risks that arise from the breakdown of the entire system, rather than from the failure of individual parts⁷. This may be the case if an ecosystem collapses due to the accumulation of physical risks, if multiple sectors are affected by physical and transition risks, and/or if the financial problems of one or more companies or financial institutions spill over to the entire system.

The extent to which climate and environmental risk factors permeate or interact with the institution may differ from sector to sector and also depend on the institution's business model. The sector-specific tabs contain a table with examples of how these risk factors feed through into existing financial and non-financial risks. In addition to these direct impacts, financial institutions may face indirect or second-order effects. The (negative) impact on the financial system may in turn worsen the macroeconomic conditions. The feedback arrows between the economy and the financial system in Figure 1 illustrate these second-order effects.

⁵ Financial risks also include market, liquidity and credit risks. Non-financial risks include business model/strategic risk, governance risk and operational risk.

⁶ Ecosystems are complex and dynamic systems of plants, animals and microorganisms, as well as the non-living environment, interacting as a functional unit. See inter alia the DNB study [Indebted to nature – Exploring biodiversity risks for the Dutch financial sector](#).

⁷ See also TNFD's definition of nature-related systemic risks: TNFD's definitions of risks » TNFD.

Figure 1 Climate and environmental risks as a source of oversight risk⁸

⁸ Figure 1 is for illustrative purposes only and is not exhaustive for every FMI. The climate and environmental risk factors that may affect an FMI, and to what extent, vary by FMI.

For example, the increased frequency and intensity of extreme weather events may affect the physical premises of an FMI or those of its clearing members, participants, clients or liquidity and other service providers. An abrupt repricing of assets or products could also be cause for a significant risk management response.

Although there are different views of the combination of factors leading to the so-called Nasdaq Clearing incident in September 2018, this incident can serve as an illustration of what can go wrong. The incident was at least partly triggered by a widening of spreads in the energy markets, with German energy prices rising due to lower supply of pollution rights (transition risk) and Nordic energy prices falling due to heavy rains (physical risk). It is worth noting that the impact of climate and environmental risks may also have implications for markets other than energy markets. Commodities markets could be impacted, for example, or the stock prices of affected companies could suffer revaluation.

More information on sector-specific climate risk exposures for FMI can be found in the [Visual](#) of possible examples in the Annex.

Characteristics of climate and environmental risks

Climate and environmental risks have specific characteristics that are important in the integrated management of these risks. Climate and environmental risks are systemic in nature and have a non-linear impact. Historical data is therefore often of limited value in assessing the risks. In addition, they are characterised by the enormous scope and scale of the impacts, uncertain timing ranging from the short to long (or very long) term, and dependence on short-term action and policy measures. Finally, climate and environmental risks are relatively new in the financial sphere, and new developments and insights are emerging in rapid succession.

Good practices with reference to relevant principles

Introduction

The main objective of the PFMI is to enhance safety and efficiency in payment, clearing, settlement, and documenting arrangements, and more broadly, to limit systemic risk and foster transparency and financial stability ([Principles for Financial Market Infrastructures \(PFMI\) \(bis.org\)](#)). As climate and environmental risks can lead to financial or non-financial risks for financial institutions, and may even lead to systemic risks, the PFMI offer a good framework for incorporating climate and environmental risks in an FMI's risk management. The PFMI also address the areas of attention for FMIs that are mentioned in the DNB Guide to managing climate and environmental risks. The PFMI are constructed in such a way that the main principle is described first, followed by key considerations, which are further detailed in explanatory notes. The good practices below make use of all these elements of the PFMI.

The following section begins by describing the relevant principle from the PFMI, followed by an explanation of how the principle could be interpreted in view of climate and environmental risks. This is followed by one or more practical examples of how the application of the principle could be applied by an FMI, and why it is deemed a good practice. These good practices are partially based on round tables with Dutch FMIs, and partially inspired by literature, seminars and bilateral talks.

As stated earlier, by considering the applicability of these good practices, FMIs should take into account the proportionality and materiality of the risks for their business. Moreover, new rules and regulations may change the way in which FMIs have to address climate and environmental risks, and may even make some of these good practices obsolete.

Box 1 Focal points for materiality analysis

Financial Markets Infrastructures (FMI) should manage material risks appropriately. The same applies to material climate and environmental risks. Whether climate and environmental risks are material to the institution can be determined by means of a materiality analysis.

When conducting a materiality analysis, an FMI can take the following focal points into account:

1. *Difference between physical and transition risk factors*

Examples of physical risk factors include drought, floods, biodiversity loss and water stress. Transition risk factors include policy, technology and market sentiment.

2. *Impact on the various risk areas*

This involves identifying how the physical and transition risk factors may impact the risk domains used by an FMI, such as credit, liquidity, operational/reputational, business model and strategic risk (see the "Climate and environmental risks" tab for an explanation of how climate and environmental risks impact risk categories).

3. *Different time horizons*

Here a distinction can be made between the short (0-5 years), medium (5-10 years) and long (>10 years) term.

4. *Qualitative and quantitative analysis methods*

Examples of quantitative methods include exposure and/or concentration analysis, scenario analysis, sensitivity analysis, portfolio alignment assessment and ratings or climate scores from external data providers. Qualitative methods include a heat map and qualitative scenario analysis.

5. *Materiality assessment*

Materiality can be assessed by combining information on probability and impact for different time horizons. This assessment is FMI-specific and depends on an FMI's business model, operational environment and risk profile. It is important that FMIs record the results of this analysis. This will enable an FMI to provide an explanation if climate and environmental risks turn out to be non-material.

Principle 2: Governance

An FMI should have governance arrangements that are clear and transparent, promote the safety and efficiency of the FMI but also support the stability of the broader financial system and other relevant public considerations, including the objectives of relevant stakeholders.

Good governance implies among other things that risk management techniques are regularly questioned, also with regard to climate and environmental risks. These could be effectively integrated into the organisation and its risk management.

Good practice: Board-level involvement

An FMI considers climate and environmental risks to be a board-level issue. The board has embedded climate and environmental risks in the company's governance, strategy, risk appetite and risk management framework. As climate and environmental risks affect the institution in multiple ways, they are addressed in an integrated manner. The board expects that climate and environmental risks are regularly put on the agenda of senior management. The board promotes a culture of values, standards and behaviour that contributes to conscious consideration of climate and environmental risks. Management engages in dialogue with members of its ecosystem consisting of its customers, clearing members, clients and service providers. Their interests and views are included in their considerations.

We consider this a good practice because:

- The FMI shows robust governance and strong awareness by demonstrating clear ownership of climate and environmental risks affecting the organisation.
- Stakeholders are included in the risk management process.

Good practice: A Corporate Sustainability Office

A large FMI that has identified material climate and environmental risks has established a Group Corporate Sustainability Office and appointed a Chief Sustainability Officer to address climate and environmental risks pro-actively. The Group Corporate Sustainability Office is combined with functions of the Corporate Social Responsibility team. The main role of this central office is to coordinate, communicate and work with different streams to ensure a consistent climate and environmental risk strategy.

We consider this a good practice because:

- The establishment of a dedicated Sustainability Office and Officer introduces focus in the organisation to address climate and environmental risks.
- The FMI adopts a proportionate and risk-based approach that is geared to the size of the institution and the materiality of its exposure.

Principle 3: Framework for the comprehensive management of risks

An FMI should have a sound risk management framework for comprehensively managing legal, credit, liquidity, operational and other risks.

An FMI understands the impact and materiality of climate and environmental risks on its risk profile. This is necessary to enhance the existing risk management framework to ensure robust risk identification, measurement, monitoring and mitigation. This implies that climate and environmental risks are explicitly integrated in the existing risk management cycle and that the existing risk appetite is included. The aim is to address risks before they materialise.

Good Practice: A broad initial materiality analysis

An FMI has conducted a broad initial impact and materiality analysis of the climate and environmental risks facing the entire organisation and its ecosystem, consisting of its customers, clearing members, clients and service providers, according to the “know your customer, know your environment” principle. It has also developed a list of available (and unavailable) alternatives, for example other service providers, which makes vulnerabilities more explicit.

We consider this a good practice because:

- A broad initial analysis by management and staff provides thorough insight into how climate and environmental risks can affect the organisation.
- The FMI also considers how climate and environmental risks affect its ecosystem and its (main) service providers.

Good practice: Insight into risks and exposures

An FMI develops insight into risks and exposures among participants in its ecosystem. It uses a broad definition of participants in the ecosystem when measuring, monitoring and managing processes to arrive at a comprehensive understanding of the various vulnerabilities. The FMI acknowledges that extreme, but plausible events can occur, and that this increases the climate and environmental risk exposures that have to be addressed. It has developed forward-looking scenarios to do so. The FMI measures, monitors and manages exposures and resources in a broad manner and triggers discussions between FMIs and participants.

We consider this a good practice because:

- Proper knowledge of climate and environmental risks, exposures and ways to mitigate them are important aspects of a comprehensive risk management framework.
- Involvement and discussions between members of the ecosystem are essential for acquiring knowledge and understanding and taking adequate measures to mitigate risks.

Good Practice: Adequate information and data

An FMI has analysed whether available information and data are adequate to comprehensively assess its climate and environmental risks. It has concluded that it must insource new information and (internal and external) data to develop an appropriate data infrastructure. These new sources of information and data enable it to improve the management of these risks with regard to, e.g.: i) the potential size of its operational costs, ii) the impact on valuation of its assets, and iii) of its exposure to “brown assets” (directly and indirectly).

We consider this a good practice because:

- The basis for thorough and comprehensive risk management is adequate information and data. This requires periodic reevaluation and adjustment of the data and information that are available and actually used.
- The FMI takes responsibility for ensuring a high standard of information and data for the ongoing comprehensive management of risks, including climate and environmental risks.

Good practice: Scenario development

Due to a lack of broadly agreed standards or scenarios, an FMI has developed its own climate scenarios to assess several types of climate and environmental risks within various timeframes, ranging from 1 to 5 years. For the development of the scenarios it has looked into those developed by international organisations or supervisors (NGFS, ESMA), while also making use of expert opinions, climate ratings and input from members of its ecosystem (clearing members, clients and service providers) to develop scenarios. The scenarios include differing transition paths to a carbon-neutral future, e.g. an orderly transition scenario (a gradual increase in carbon prices), a disorderly transition scenario (sudden and steep hikes in carbon prices) and a “hot house world” scenario with no further policy action.

scenarios, including, but not limited to, the default of the participant and its affiliates that would potentially cause the largest aggregate credit exposure of the CCP in extreme but plausible market conditions.

It is important that an FMI identifies sources of credit risk and corresponding exposures, also including climate and environmental risks.

Good practice: credit risk and stress testing

An FMI has developed climate and environmental risk considerations in the stress testing of its internal credit risk model. It is aware that historical information has limitations and that its participants have their specific exposures to climate and environmental risks and carbon price shocks.

We consider this a good practice because:

- The FMI develops its own assessment of risks for different extreme but plausible scenarios.
- Although there is a scarcity of relevant, granular and forward-looking data, the FMI is now acting based on existing or newly developed insights and available possibilities.

We consider this a good practice because:

- The FMI realises that credit exposures and financial resources can be affected by climate and environmental risk in a broad sense, and that historical data or information may not be sufficient to assess these risks in credit risk models.

Principle 4: Credit risk

An FMI should effectively measure, monitor and manage its credit exposures to participants and those arising from its payment, clearing and settlement processes. An FMI should maintain sufficient financial resources to fully cover its credit exposure to each participant with a high degree of confidence. In addition, a CCP that is involved in activities with a more complex risk profile or one which is systemically important in multiple jurisdictions should maintain sufficient additional financial resources to cover a wide range of potential stress scenarios that include, but are not limited to, the default of the two participants and their affiliates that would potentially cause the largest aggregate credit exposure to the CCP in extreme but plausible market conditions. All other CCPs should maintain sufficient additional financial resources to cover a wide range of potential stress

Principle 5: Collateral

An FMI that requires collateral to manage its or its participants' credit exposure should accept collateral with low credit, liquidity and market risks. An FMI should also set and enforce appropriately conservative haircuts and concentration limits.

An FMI could include climate and environmental risks in its well-designed collateral management system.

Good practice: value of collateral

In its collateral management system, an FMI acknowledges that physical risks or changes in climate policy, especially if abrupt and disorderly, may trigger transition risk and erode the value of the financial assets and the financial condition of a participant. It also takes into account that changes in environmental policies and technology may reduce demand in certain “brown” market segments. This could trigger a reduction in market demand and related liquidity of a cleared product or accepted collateral. It also assesses its collateral in terms of environmental impact, vulnerability of carbon price shocks, and sees if it is possible to switch to so-called green assets as collateral.

We consider this a good practice because:

- The FMI develops understanding about how climate and environmental risks can lead to higher volatility in the valuation of financial assets, and considers mitigating measures such as switching to green assets as collateral.

Principle 6: Margin

A CCP should cover its credit exposures to its participants for all products through an effective margin system that is risk-based and regularly reviewed.

The increased frequency and intensity of extreme weather events, possibly combined with transition risk, may trigger abrupt repricing of assets or products. This can cause significant risk, translating into prompt and significant margin calls.

Good practice: margin calls in case of climate and environmental risks

An FMI (CCP) requires all members of its ecosystem (clearing members and clients) to be able to deal with sharp and prompt margin calls, also due to their exposure to climate and environmental risks. This holds especially for CCPs that are active in commodities (energy, emission allowances) markets and commodities (energy, emission allowances) derivatives markets.

We consider this a good practice because:

- The FMI (CCP) gathers knowledge of the different risk profiles of its clearing members' and clients' products.
- It is aware that commodities and commodities derivatives tend to be more exposed to climate and environmental risk, especially energy products and energy derivatives.

Principle 7: Liquidity risk

An FMI should effectively measure, monitor and manage its liquidity risk. An FMI should maintain sufficient liquidity in all relevant currencies to effect same-day and, where appropriate, intraday, and multi-day settlement of payment obligations with a high degree of confidence in a wide range of potential stress scenarios, including, but not limited to, default of the participant and its affiliates that would generate the largest aggregate liquidity obligation for the FMI under extreme but plausible market conditions.

Since FMIs face the risk that a counterparty may be unable to fully meet its financial obligations when due or at any time in the future, they should actively monitor their liquidity risks. They could also consider including climate and environmental risk observations in their tools for managing liquidity risks.

Good practice: liquidity risk

An FMI recognises that an extreme weather event can damage the value of its own (non-) financial assets or its own operational ability to meet obligations. This can also be relevant for all members of her ecosystem. Primary or back-up locations or data centres belonging to the FMI and its participants can be damaged or go totally offline. The FMI understands that its financial condition and ability to meet financial obligations can be eroded because access to stable sources of funding could be reduced as market conditions change. It therefore considers how climate and environmental risks can be incorporated into its existing internal risk models.

We consider this a good practice because:

- The FMI recognises that its participants can experience liquidity problems due to climate and environmental risks.

Principle 15: General business risk

An FMI should identify, monitor and manage its general business risk and maintain sufficient net liquid assets, funded by equity, to cover potential general business losses, so that it can continue to operate its business and provide services if such losses materialise. Furthermore, net liquid assets should at all times be sufficient to ensure a recovery or orderly wind-down of critical operations and services.

Climate and environmental risks may have a direct or indirect (financial) impact on the business model of an FMI and its underlying financial position. Changes in environmental policies may reduce demand in certain "brown" market segments and harm the long-term business viability of the FMI serving them. Extreme weather or other climate change-related events may increase operational expenses for an FMI (of any type) for a certain period of time. They may damage the value of the non-financial assets of an FMI, causing the FMI to experience an extraordinary one-time cost.

Good practice: reputational and long-term viability

An FMI realises that it may suffer reputational damage if it lacks preparedness and commitment to the transition to a greener economy and/or financial system. It is aware that its business locations can be affected by extreme weather events, and gives thought to relocating them, taking into account the medium and long term. It also considers the possibility of long-term financial losses related to liability or reputational damage, if after a flood or storm it is unable to perform and deliver its services.

We consider this a good practice because:

- The FMI maintains a sustainable business model by including climate and environmental risks.
- The FMI shows forward-looking commitment by taking reputational and business risks seriously and including climate and environmental risks.

Good Practice: Decision on strategy; a catalyst or an enabler.

An FMI recognises that climate and environmental risks can also create opportunities for its general business, and the board is actively looking into financial innovation of its products and services to accommodate participants' needs. Taking into account the risk appetite and the risk implications, the board has taken an informed decision to be an enabler for change, and has disclosed substantiated information about its decision. Moreover, it is developing an action plan in which it sets goals for the own decarbonisation to net zero emissions by 2050 with clear sub-goals along the way. It is establishing a system to measure and disclose its progress. Progress towards the goals is on the agenda of board meetings and it is discussed on a regular basis.

We consider this a good practice because:

- The FMI shows that it takes climate and environmental risks seriously and that, given its risk appetite, it can also make a positive contribution to a greener economy.
- The FMI is aware of its carbon footprint and adaptations for planned improvement are formulated and disclosed.
- Plans for change and progress made are discussed on a regular basis in board meetings.

Principle 16: Custody and investment risks

An FMI should safeguard its own assets and its participants' assets and minimise the risk of loss of and delay in access to these assets. FMI investments should be in instruments with minimal credit, market and liquidity risks.

An FMI evaluates and understands exposures to assets by also taking into account climate and environmental risks.

Good practice: management of participants' assets

An FMI realises that it is important to include climate and environmental risks in participants' asset management. It understands that assets may not be returned promptly when required due to an operational outage of a service provider caused by an extreme weather event. It gathers insight into these vulnerabilities and sees whether backup facilities are available. Moreover, it takes into account that the value of invested assets may be exposed to an unexpected change in climate or climate policy. It considers readjustments when needed, for example towards more sustainable assets.

We consider this a good practice because:

- Insight in participants' vulnerabilities can encourage the FMI to develop adequate back up facilities (whenever possible).
- Knowledge of vulnerabilities of invested assets in relation to climate and environmental risks can encourage FMI management to decide to switch to more sustainable assets.

Principle 17: Operational risk

An FMI should identify the plausible sources of operational risk, both internal and external, and mitigate their impact through the use of appropriate systems, policies, procedures and controls. Systems should be designed to ensure a high degree of security and operational reliability and have adequate, scalable capacity. Business continuity management should aim for timely recovery of operations and fulfilment of the FMI's obligations, including in the event of a wide-scale or major disruption.

- All types of FMIs face operational risk from internal and external events that have the potential to result in the reduction, deterioration or breakdown of their services. The development of an integral business continuity plan also covering climate and environmental risks is recommended.

Good practice: broad due diligence and business continuity

An FMI includes a due diligence investigation in relation to climate and environmental risk to all stakeholders across the value chain, and considers their general resilience, including the resilience of their physical and financial assets. It has developed a business continuity plan that addresses events posing a significant risk of disrupting operations, including climate events. It also dedicates specific attention to the climate change risk consciousness in the business continuity plans of its participants and utilities/third-party service providers.

We consider this a good practice because:

- The FMI looks at the ways in which its business continuity plan deals with possible events arising from climate and environmental risk.
- The FMI pays attention to the business continuity plan in relation to the climate and environmental risks of its participants and utilities/third-party service providers.

Good practice: predict the unpredictable

An FMI realises that, due to the unpredictable nature of climate change risks, historical data is not very informative for risk management purposes. In the context of business continuity planning, this requires the assumption of more extreme, forward-looking risk scenarios going beyond traditional medium-term time frames. It reassesses its standard statistical risk management techniques continuously, and acknowledges that climate change will likely result in more frequent “once-in-a-century extreme weather events”. Hence, it incorporates more rigorous stress testing with a wider range of scenarios, including hypothetical ones.

We consider this a good practice because:

- The FMI uses historical loss experiences as a starting point to estimate operational risk. However, management realises that climate and environmental risks are expected to materialise over a long time horizon.



Principle 23: Disclosure of rules, key procedures and market data

An FMI should have clear and comprehensive rules and procedures and provide sufficient information to enable participants to have an accurate understanding of the risks, fees and other material costs they incur by participating in the FMI. All relevant rules and key procedures should be publicly disclosed.

Disclosure and transparency are important factors to foster awareness and understanding of each other's business and connected risks. Various initiatives are underway to promote and improve transparency on climate and environmental risks in the financial sector. For that matter, a wide range of useful standards are being developed. One of the important reporting standards for climate and environmental risks that is now being developed stems from the European Corporate Sustainability Reporting Directive (CSRD); these are the so-called European sustainability reporting standards (ESRS). The work done by the Financial Stability Board (FSB) Task Force on Climate-related Financial Disclosures (TCFD) is considered relevant and useful in this context. The [International Sustainability Standards Board](#) (ISSB) provides a comprehensive global baseline of sustainability-related disclosure standards for investors and other capital market participants that can serve as inspiration for FMIs.

Good practice: disclosure of information by an FMI to participants

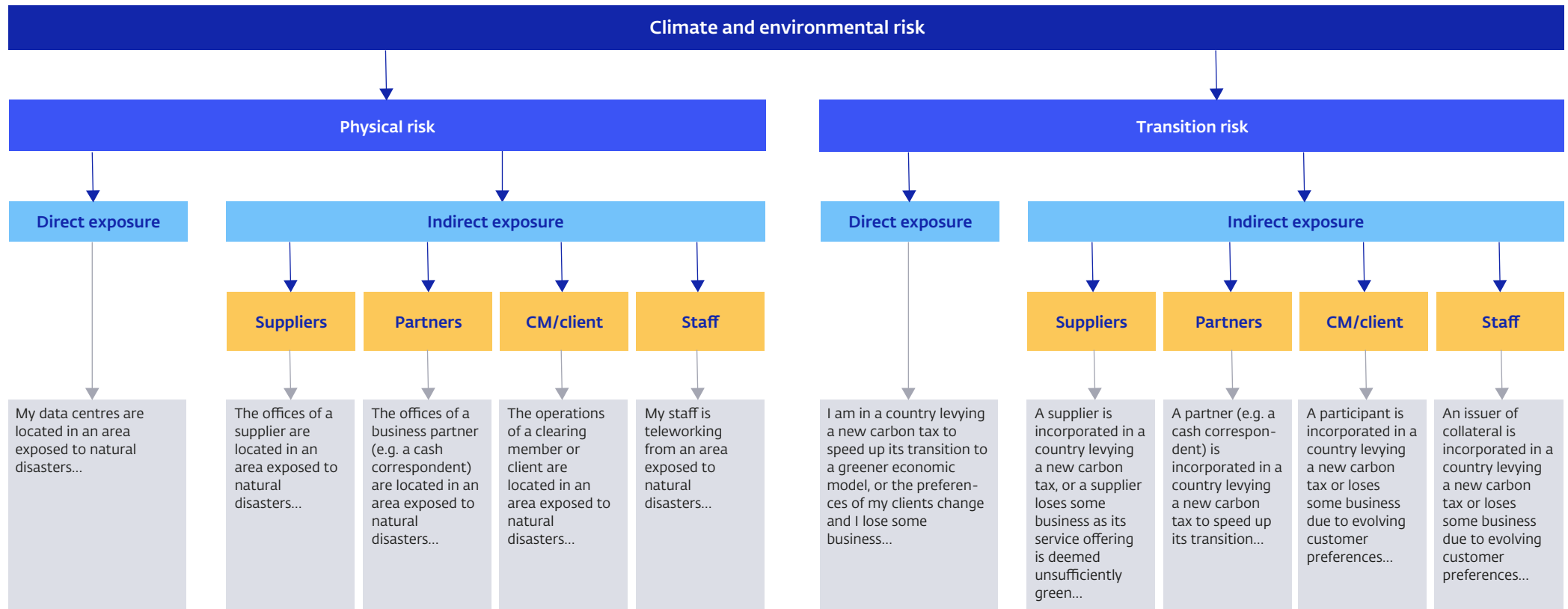
An FMI discloses information in its annual report regarding its exposure to, and preparedness for, climate and environmental risks. It includes information about its own action plan and the progress that is made in carrying out that plan.

We consider this a good practice because:

- Climate and environmental risks form an integral part of the disclosure of information about the FMI.
- Disclosure of plans and progress made enables stakeholders and the public to understand the long-term environmental strategy and possible climate or environmental risk the FMI is exposed to, which can contribute to building a sustainable reputation.

Annex

Visual of FMI climate and environmental Risk Exposures (with possible examples)



Relevant principles

> Principle 2: Governance

> Principle 3: Framework for the comprehensive management of risks

> Principle 4: Credit risk

> Principle 5: Collateral

> Principle 6: Margin

> Principle 7: Liquidity risk

> Principle 15: General business risk

> Principle 16: Custody and investment risks

> Principle 17: Operational risk

> Principle 23: Disclosure of rules, key procedures and market data

Disclaimer

These Good practices provide non-mandatory recommendations to FMIs for the application of the European Market Infrastructure Regulation, Central Securities Depositories Regulation, and Principles for Financial Market Infrastructures, insofar as De Nederlandsche Bank N.V. is responsible for overseeing the FMIs.

With the aid of these Good practices, De Nederlandsche Bank N.V. expresses its views on the behaviour it has observed or expected in policy practice, which in its opinion constitutes a proper application of the rules to which this document relates. With these Good practices, De Nederlandsche Bank N.V. aims to ensure that FMIs consider the provisions therein, taking their own circumstances into account, without being obliged to do so. The Good practices provide insight into the behaviour observed or expected by DNB in policy practice, is indicative in nature and does not exclude the possibility that institutions may need to apply the underlying rules in a different, potentially stricter, way. The decision on how to apply rules rests with these institutions themselves.

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