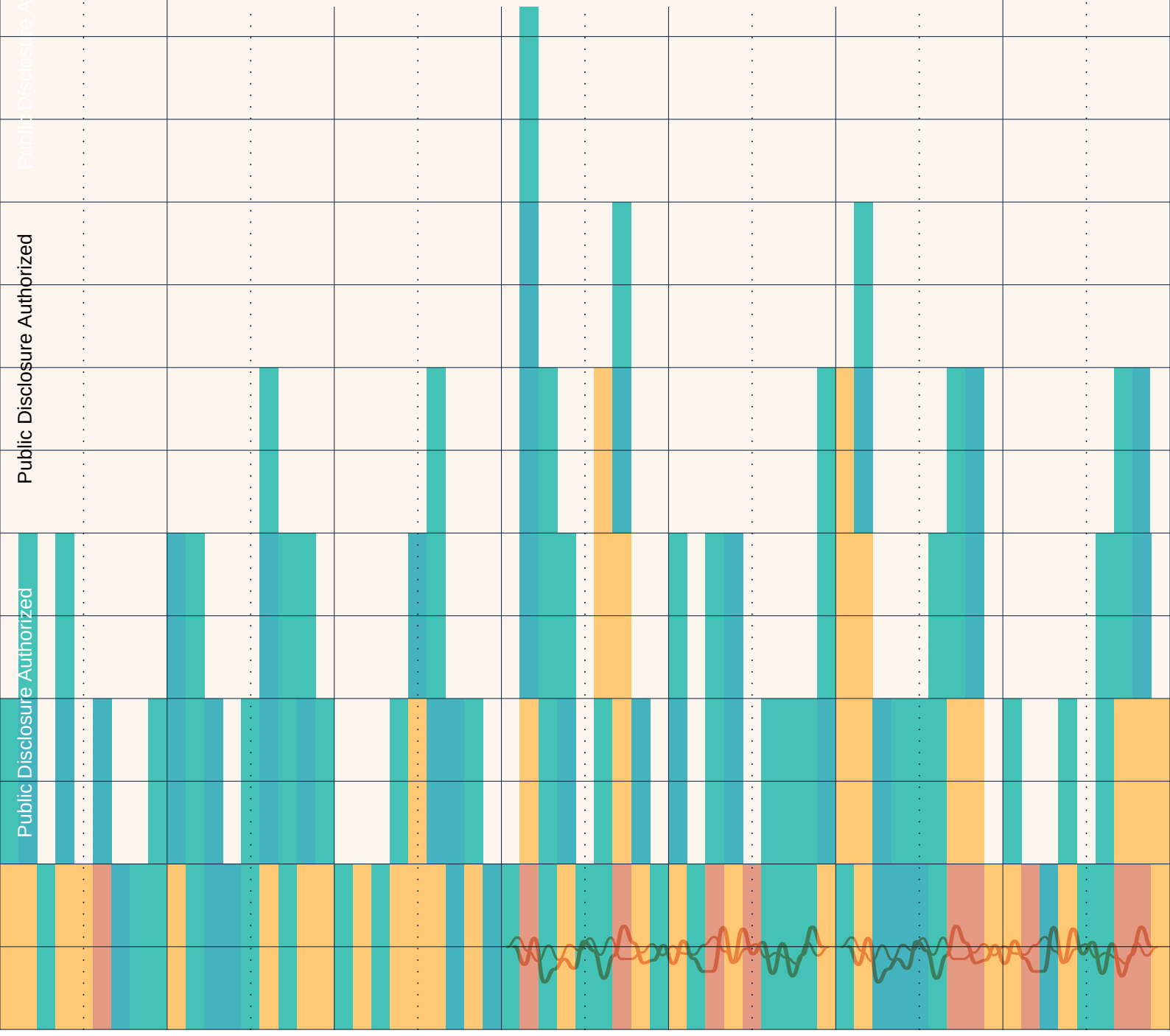
Technical Brief on

Resilient Infrastructure Public-Private Partnerships: Policy, Contracting, and Finance



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Citation

Please cite the report as follows: World Bank. 2019. “Technical Brief on Resilient Infrastructure PPPs – Contracts and Procurement” World Bank, Washington, D.C.

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ACKNOWLEDGEMENT

This brief was prepared by the World Bank's Tokyo Disaster Risk Management (DRM) Hub, Global Infrastructure Facility (GIF), and the Public-Private Infrastructure Advisory Facility (PPIAF) with contributions from PwC Advisory LLC. The team comprised of Sanae Sasamori, Naho Shibuya, Schuyler House, Mariko Ogawa, Maika Watanuki, and Junya Tanaka. The team thanks the World Bank peer reviewers: Stephane Hallegatte, Fiona Collin, Eusoph Deriza Kanyenda, Hideaki Hamada, and Christina Paul. The team also thanks support from Shoko Takemoto, Haruko Nakamatsu, Luis Tineo, Philippe Neves, Jason Lu, and Jordan Schwartz. This product was designed by Saengkeo Touttavong.

This brief was made possible with the financial support of the PPIAF and Japan-World Bank Program for Mainstreaming Disaster Risk Management in Developing Countries, which is financed by the Government of Japan and receives technical support from the World Bank Tokyo Disaster Risk Management Hub.

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Resilience and Finance: A Dual Infrastructure Challenge

Long-term financial constraints have motivated governments to engage the private sector in public infrastructure development, including through public-private partnerships (PPPs).

More recently, governments, researchers, and development practitioners have turned their attention to the importance of improving the resilience of infrastructure assets to natural disasters, as well as to the key role infrastructure plays in the resilience of communities, especially in the context of climate variability. During 1998–2017, disaster-hit countries reported direct economic losses of approximately US$2.9 trillion, of which 68 percent account for climate-related disasters.[1] The reported losses from extreme weather events rose by 151 percent compared to the total reported losses of US$1.3 trillion during 1978–1997. Floods accounted for approximately 43 percent of recorded events affecting more than 2 billion people, followed by storms (28 percent) and earthquakes (8 percent). During this period, climate-related and geophysical disasters took the lives of 1.3 million people and left 4.4 billion people injured, homeless, displaced, or in need of emergency assistance. These enormous economic losses of human life have promoted attention to the importance of disaster risk management (DRM) and the impacts of climate change, particularly in countries most vulnerable to natural hazards. As such, governments are tasked with ensuring that sufficient funds and expertise are available to develop and supply quality infrastructure that can also (a) better withstand and recover from disasters and (b) adjust to changing conditions associated with climate change.

What is resilient infrastructure PPP?

Despite concurrence of these trends, there is a lack of documented knowledge regarding approaches to designing and delivering resilient infrastructure through PPPs. As governments and their development partners continue to develop mechanisms and approaches to incorporate resilience into infrastructure development through PPPs, it is worthwhile to address the remaining knowledge gaps to advance resilience via infrastructure PPPs. A resilient infrastructure PPP is envisaged as one that serves policy goals associated with resilience, meets legal requirements and policy standards that promote asset resistance, incorporates resilience in project planning, and mainstreams DRM considerations at all stages of the PPP lifecycle.

What do we know, and what are the knowledge gaps?

Many countries recognize the importance of considering site-specific climate and disaster risks in infrastructure planning[2] and have committed to creating enabling environments at the policy and project levels.[3] However, there is limited experience in operationalizing these commitments or mainstreaming disaster and climate considerations in PPP development. While development partners

1 CRED (Centre for Research on the Epidemiology of Disasters) and UNISDR (UN Office for Disaster Risk Reduction). 2018. Economic Losses, Poverty & Disasters: 1998–2017. https://www.unisdr.org/we/inform/publications/61119.

2 Boyle, J., M. Cunningham, and J. Dekens. 2013. Climate Change Adaptation and Canadian Infrastructure: A Review of the Literature. International Institute for Sustainable Development. https://www.iisd.org/pdf/2013/adaptation_can_infrastructure.pdf.

3 ADB (Asian Development Bank). 2013. Making Infrastructure Disaster Resilient. https://www.adb.org/sites/default/files/evaluation-document/36101/files/learning-lessons-disaster-resilience-3.pdf; Japan Ministry of Land, Transport and Infrastructure. 2013. Task Examination Task for Promoting Disaster Prevention and Mitigation Measures for Large Scale Disasters through Public-Private Partnership (translated). http://www.mlit.go.jp/sogoseisaku/kanminrenkei/sosei_kanminrenkei_fr1_000021.html; UK Department for Environment, Food and Rural Affairs. 2011. Climate Resilient Infrastructure: Preparing for a Changing Climate. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69269/climate-resilient-infrastructure-full.pdf.

have suggested that governments incorporate climate and disaster considerations in project preparation and procurement,[4] most are yet to introduce these into policy frameworks or infrastructure planning processes, often due to high uncertainties about hydro-meteorological and geographical risks. Moreover, governments are challenged by limited climate and disaster risk data[5] and the lack of consensus on required levels of resilience.[6] Current advice proposes mainstreaming resilience at multiple stages of the project lifecycle. World Bank research suggests that integrating resilience in PPP requires attending to PPP policy and law, identifying project-level requirements, allocating disaster risks between public and private sector, creating the right incentive structures for active management of climate and disaster risks in contracts and procurements, applying disaster risk financing tools, and embedding flexibility in the PPP process.

Contracts remain a key means of allocating disaster risk in PPPs, and efforts are apace to develop standardized contract provisions to help governments effectively define force majeure and establish disaster responses. A 2015 World Bank review of PPP contracts recommended language for clearly dealing with disasters and suggested additional specification of consequences in case of force majeure. To maximize PPP value for money (VfM), governments are also investigating approaches to transfer disaster risks to private parties. Moreover, since extreme and unpredictable weather events could become more common, force majeure provisions may be an increasingly ineffective means of managing disaster risk.[7]

Disaster risk financing, including insurance, will likely play a more important role in the future of infrastructure PPPs. While this is still a developing field, there are some important experiences to draw from infrastructure PPPs. The insurance and reinsurance industries in Canada have insured against climate risks, for example, and have made efforts to quantify financial and economic impacts of climate change.[8] Kenya has also developed an active insurance market for drought and flood. Designing effective disaster risk financing tools will require high levels of collaboration among financiers, governments, and insurers.[9]

Another area for developing knowledge relates to technical specification of risk allocation and how contracts determine responses and cost-sharing following disaster. To date, there is limited accumulated knowledge on how and to what extent project agreements specify rights and obligations of parties following disaster events. Very few studies have assessed risk allocation in contractual provisions, definitions of force majeure across countries and sectors, or the requirements for effective risk sharing in infrastructure PPP contracts.

4 Sundararajan, S., and N. Suriyagoda. 2016. Climate Risks and Resilience in Infrastructure PPPs: Issues to Be Considered. PPIAF, World Bank Group. https://ppiaf.org/documents/2870/download.

5 PwC. 2010. Adapting to Climate Change in the Infrastructure Sectors. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/183493/infrastructure-pwc-full.pdf.

6 WEC (World Energy Council). 2015. World Energy Perspective The Road to Resilience - Managing and Financing Extreme Weather Risks. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/183493/infrastructure-pwc-full.pdf.

7 IFC (International Finance Corporation). 2016. How to Make Infrastructure Climate Resilient. https://www.ifc.org/wps/wcm/connect/5f53054c-d88a-4700-9d16-69a552a4ec6c/Note+14+EMCompass+-+How+to+Make+Infrastructure+Climate+Resilient.pdf?MOD=AJPERES.

8 Boyle, Cunningham, and Dekens 2013.

9 IFC 2016.

This brief and its attendant case study research attempt to fill some of these gaps. The knowledge compiled in this brief draws primarily on PPP experiences in three countries—Japan[10], India[11], and Kenya—and from international standards, including U.K. standard contracts and recommended standards of the United Nations. Reflecting on lessons learned from these cases, this brief highlights key considerations and good practices for incorporating disaster resilience into PPPs in contracting and procurement. Japan, for example, has incorporated increasingly specific contract agreements that establish parties' recovery obligations tied to various degrees of intensity of natural hazard events. Government has increasingly transferred risks to the private sector as information and experience drives learning about PPP operations and recovery following actual disaster events. In India, the preparation of model contracts and dissemination of a standardized definition for force majeure has helped PPP participants consider key risks in PPP contracts. Moreover, independent engineers are engaged to support contracting agencies in project planning and oversight, including issues related to disaster management. In Kenya, the government is expanding options for disaster risk financing to make contingent funds available to infrastructure developers.

Additional resilience challenge for PPPs. Incorporating resilience and justifying additional project preparation costs can be more challenging for PPPs than for purely public projects. PPPs typically involve higher short-term project development costs than public projects due to the need for specialized support staff, including legal and financial advisors, and the additional costs and time required for contracting and procurement. With limited resources available, the burden is on the government to control costs and advance a potential PPP project at a reasonable pace during project preparation and contracting—pressures that can be exacerbated by additional requirements associated with mainstreaming DRM. Moreover, because natural disasters are uncertain and resilience-building efforts costly, difficult decisions must be made about the desirable level of investments and the prioritization of DRM initiatives. Total resistance is often not only impractical but may also be inefficient. Thus, safe-to-fail designs may be considered to minimize adverse public safety impacts and prevent loss of life where disasters are highly unlikely and the costs of mitigation high. Decisions about levels of effort and investment may be supported by historical geophysical, meteorological, or seismic data. But in many countries, data are insufficient to develop probabilistic models. Even if data are available, increasing uncertainties associated with climate change challenge the robustness of established disaster models. Nevertheless, there exists a wide array of technical and organizational options for designing adaptation and adjustment mechanisms and managing disaster risks—a central issue for resilience and PPP bankability in hazard-prone locations.

10 World Bank. 2017. Resilient Infrastructure PPPs: Contracts and Procurement – the Case of Japan.

11 World Bank. 2018. Resilient Infrastructure PPPs: Contracts and Procurement – the India Country Brief.

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Managing Disaster and Climate Risks in Infrastructure PPPs

While all PPPs inevitably deal with financing, construction, regulatory, demand, and operational risks, among others, projects in disaster-prone regions must additionally develop commercially and technically viable solutions for managing disaster risk.

For PPP projects, natural disasters and climate change can impose negative impacts on government, private sector parties, and end users of infrastructure services, including

- Asset damage and deterioration and reduced asset life,
- Increases in operating expenditure and the need for additional capital expenditure,
- Disruption to service provision,
- Loss of income,
- Increased risks of environmental damage and litigation,
- Reputational damage,
- Changes in market demand for services, and
- Increased insurance premiums or lack of insurance availability.

Governments play a central role in determining disaster risk allocation with a view to minimize these potential impacts. As with the many other risks that must be allocated in PPP for effective implementation (for example, construction, operation and maintenance [O&M], demand, political, regulatory), disaster and climate risks should be allocated to the public or private party that is best placed to manage them in a cost-effective manner. The allocation of these risks may depend on the probabilities and magnitudes of natural hazards, the criticality of the service to the economy and public safety, and the level of development of the PPPs and supportive insurance markets.

Approaches to managing disaster risks—whether via mitigation, avoidance, transfer, or planned acceptance—come into play at different stages of planning, project selection, structuring, contract design, monitoring and oversight, and post-event response. For example, contracts may be designed to appropriately allocate risks and incentivize risk mitigation by private sector partners; design and construction standards may be imposed to ensure more robust designs to protect against shocks; financial tools such as guarantees can transfer risks to ensure the viability of a potential PPP; and project planning principles and feasibility study requirements can help participants identify, avoid, and mitigate various disaster risks.

To successfully manage risks in PPP, governments must see that relevant disaster risks are thoroughly assessed, contractually allocated, and effectively managed in a manner that preserves PPP profitability. This often involves government playing a central role in promoting PPP resilience by way of contracting, regulatory oversight, and direct provision of some services to promote resilience. Given the contractual nature of PPP, another key role of government is to establish common definitions of and metrics for risks and potential disaster events that must be dealt with if their occurrence is likely to affect the operation or profitability of a PPP. This includes establishing clear definitions for 'force majeure' events—unexpected events beyond the control of government or the operator that prevent either party from complying with its obligations.

/03

Challenges for Structuring Resilient Infrastructure PPPs

Central to incorporating resilience in PPP is the mainstreaming of DRM in project planning, contract design, and procurement. To ensure that disaster responses are effectively delivered, governments must mainstream DRM in project planning and procurement, particularly through setting technical standards for bids and contracts and by establishing terms for bidding, award, and remuneration that reward resilience measures.

These issues are largely contractual but also include decisions about available government support and organizational arrangements to facilitate recovery and allow for needed adjustments following a disaster or climate event. These efforts are subject to several common challenges.To ensure that disaster responses are effectively delivered, governments must mainstream DRM in project planning and procurement, particularly through setting technical standards for bids and contracts and by establishing terms for bidding, award, and remuneration that reward resilience measures. These issues are largely contractual but also include decisions about available government support and organizational arrangements to facilitate recovery and allow for needed adjustments following a disaster or climate event. These efforts are subject to several common challenges.

Lack of coordination between DRM and PPP policy and practice: Government efforts to promote DRM are often undertaken separately from efforts to apply and improve PPP for infrastructure, though these projects may involve many of the same agencies and units. A key challenge for government is to coordinate DRM and PPP efforts and reconcile the policy frameworks for DRM and PPP. This organizational function is important to enforce established DRM policy and, where needed, to fine-tune such policies to preserve commercial viability of PPPs along with technical robustness and resilience.

Inadequate identification, assessment, and allocation of disaster risks: An operator's capacity to assume disaster risks depends on the availability of insurance, the company's financial and technical capacity, and the ability to reasonably estimate relevant disaster risks. PPP contracts often include provisions for unforeseen risks, including natural disasters, typically defined under force majeure clauses. While neither the public nor private sector is responsible for force majeure events, the associated risks must be contractually allocated. Force majeure events are often generally defined, however, and responses are often subject to high degrees of negotiation after a disaster event occurs.

Decisions about disaster risk allocation and definitions of force majeure can be more readily made in countries with national DRM frameworks and accumulated historical disaster data (for example, Japan). In such contexts, PPP contracts can draw on probabilistic risk estimations to establish customized definitions of force majeure, specify thresholds for event severity, and more effectively transfer risks via insurance. These countries can establish more specific contractual frameworks based on geographic risk profiles associated with prevalent hazards. In countries where data are limited, governments can at least identify the most relevant disaster risks, establish principles to guide risk allocation, and set general terms for government intervention or relief in the event of force majeure. Because uncertainties associated with climate change are high, undermining the reliability of probabilistic models, PPPs may benefit from planned adjustment periods wherein parties can negotiate adjustments to deal with changing environmental and other natural hazard conditions that substantially affect the base assumptions of a PPP contract.

Limited experience dealing with disaster and climate uncertainty over the long term: PPP contracts are typically long term, often extending over 20 to 30 years. During such extended periods, natural disasters are likely to occur, and long-life assets are likely to face increasing climate risks. In addition to setting appropriate design specifications to minimize structural vulnerability, thorough disaster risk assessments and discussions regarding force majeure and relief options are required during project development to establish workable terms for response and relief. Because these assessments cannot plan for every contingency, however, designed contract flexibility, low-regret adaptive strategies, and iterative decision-making processes will become increasingly important. Scheduled or triggered adjustments to PPP contracts may be set to deal with shifts that substantially change the contract's base material assumptions. The challenge, however, is that experiences with these highly reflexive systems is limited—necessitating a degree of experimentation and innovation.

Significant cost implications for PPP commercial viability: Investments in DRM and the costs associated with unexpected emergency response and recovery affect project financial outcomes, including VfM. While disaster risks should be carefully considered in early infrastructure development stages, it is not often within the private sector's commercial interest to invest in measures against long-term and uncertain risks, particularly given the uncertainties of returns on investments. Government can impose requirements to assess infrastructure risks, directly provide adjacent resistance-building infrastructure, and assume disaster risks to preserve the viability (profitability) of PPPs.

/04

Policy and Legal Frameworks for Resilient PPPs

National DRM policy and legal frameworks are foundational underpinnings that can support resilience building in infrastructure PPPs.

Most countries have formulated and implemented DRM and PPP policies and legislation separately, however. It is important for countries to reconcile existing policy and apply DRM standards to PPP contracts. Similarly, for countries formulating and establishing legal frameworks for PPP, it is important that resilience principles be incorporated (or at least DRM policy explicitly cited). By establishing central PPP support units tasked to coordinate with DRM agencies, governments can facilitate integrated approaches to developing resilient infrastructure PPPs.

While regulation and contract standardization can be effective means of mainstreaming DRM, contracting authorities must still consider local geophysical and hydro-meteorological characteristics, project and sector characteristics, and their own preferred risk exposure before standardization. These prerequisites, in turn, depend on early-stage climate and disaster screening assessments as well as application of lessons learned from past infrastructure PPPs. Government plays an important role in gathering and disseminating disaster risk data and in facilitating the use of the data to support PPP planning.

Governments can also implement policies that establish risk retention programs such as government reserves, contingency budgets, and funds at national and local levels, provide relief in the case of disaster events, or provide assistance to reinstate damaged assets.

Key objectives and related actions for policy makers in the area of policy and legal frameworks are as follows:

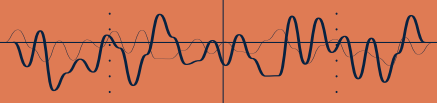
- **Establish a legal framework and institutional structure to incorporate resilience in PPP projects:**
    - Incorporate resilience considerations into PPP policies, guidelines, and standards.
    - Apply existing legal frameworks on DRM to PPP projects.
    - Prepare DRM guidelines for infrastructure or standard contract documents that introduce climate and disaster risk screening and assessment at the early planning stage.
    - Establish a coordination mechanism between PPP authorities and DRM agencies.
- **Develop a knowledge database and utilize open data on hazards during the early planning stage:**
    - Accumulate, disseminate, and utilize open data (for example, hazard maps) to screen climate and disaster risks and conduct detailed risk assessments during the feasibility study stage.
    - Capture and apply lessons learned and experiences of infrastructure PPP projects that have been affected by natural disasters.

Useful Tools and Resources

Guidance on PPP Contractual Provisions
https://ppp.worldbank.org/public-private-partnership/library/guidance-ppp-contractual-provisions-2019

/05

Project Structuring and Contract Design



A key means of effectively allocating and managing disaster risk is by way of the PPP contract itself.

This requires effective assessment to identify key risks to be addressed; the establishment of clear and agreed-upon definitions for risks and hazard events, including the definition of force majeure; the effective and thorough allocation of risk through contracts; and the design of contract terms that preserve the financial and technical viability of projects.

To assess disaster and climate risks and determine appropriate response mechanisms, consultations with private sector operators, development and finance partners, and government stakeholders are important. Such discussions can also help establish clear definitions and standards for the levels of risks borne by parties, along with appropriate risk reduction measures. These discussions will also build consensus on project characteristics that will determine how risks will be allocated.

Generally, infrastructure PPP projects that are critical to the economy and/or public safety, subject to high disaster risk that are costly to mitigate and recover from, and have limited profitability will require that government bears more disaster risk. The share of disaster risks government will bear is likely to increase if risk transfer mechanisms such as insurance are limited, financing is difficult, private asset ownership is limited, and/or the PPP market is in an early stage of development. If a public authority prefers private developers to bear more disaster risk, the capacity to allocate risks to operators will depend on the availability of insurance and other risk transfer mechanisms.

Key objectives for policy makers with respect to project structuring are as follows:

- **Identify and assess natural disaster and climate change risks and impacts:**
    - Screen site-specific climate and disaster risks during the early project planning stage.
    - Assess site-specific hydro-meteorological and geophysical risks during the feasibility study stage.
    - Identify potential risk reduction measures including engineering designs and O&M measures to address climate and natural hazard events.
- **Define key disaster and climate risks:**
    - Determine which natural hazards should be specified in a contract based on the results of risk assessment.
    - Establish common understanding of disaster and climate risks between the public and private entities.
    - Establish a clear definition of force majeure and quantitative criteria, where possible and practical, for invoking force majeure.
- **Establish a commercially viable disaster risk allocation framework:**
    - Develop a climate and disaster risk management framework based on risk assessment and established definitions.
    - Reflect sector and project characteristics in risk allocation.
    - Adopt an iterative approach to allocating risk to the private sector, depending on insurance and PPP market maturity.
    - Identify and transfer insurable risks to the private sector.
    - Address uncertainty posed by climate change via force majeure clauses and design adjustment triggers.

- **Develop flexible contractual mechanisms to ensure business continuity and commercial viability:**
    - Prepare flexible measures to enable parties to take best possible actions to respond to disaster events.
    - Establish relief mechanisms and their terms for application in the event of a disaster.
    - Develop mechanisms that enable private developers to continue operating projects safely and profitably, over a reasonable term, in case of a force majeure event.

Useful Tools and Resources

- **Think Hazard!** http://thinkhazard.org
- **Climate and Disaster Risk Screening Tool** https://climatescreeningtools.worldbank.org/
- **Decision Making under Uncertainty** http://www.deepuncertainty.org/

BOX 1

Risk Sharing Policy for the Aichi Toll Road Concession Project, Japan

One example of a risk allocation arrangement is characterized by the definition of force majeure as applied for a transport PPP in Japan, the Aichi Toll Road Concession Project. The project agreement stipulates force majeure events for which additional costs are borne by the public sector, as listed in the following table. The contracting agency (government) shall bear the cost of the specified events if the concessionaire cannot foresee or cannot be reasonably expected to establish measures to prevent additional costs.

Risk-Sharing Policy, by Disaster Type, for Aichi Toll Road Concession Project

Disaster Type	Events for Which Additional Costs Are Borne by the Public Sector
 Earthquake	Damage based on normal social conventions
 Heavy rain	Maximum rainfall of 80 mm or more in 24 hours. Even if rainfall is below the above standard, it is considered heavy rain if hourly rainfall is significant (20 mm or more), provided that the hourly rainfall is observed at the nearest weather observation station (managed by the public corporation) from the damaged place.
 Storm	Maximum wind speed of 15 meters per second or more (average in 10 minutes)
 High tide, storm surge, tsunami	Extraordinarily high tide, storm surge, or tsunami caused by a storm or its aftermath with relatively non-minor damage

Source: World Bank. 2017. Resilient Infrastructure PPPs – the Case of Japan.

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Resilient PPP Procurement, Monitoring, and Contract Management

Following the structuring of a PPP, resilience can be further promoted in the procurement process and through monitoring, oversight, and contract management. Governments can establish DRM-oriented principles of project selection and award, design incentives for promoting resilience via bid terms and selection guidelines, and enforce resilience standards by regulatory oversight.

The procurement, monitoring, and payment systems are vehicles to incentivize DRM measures using performance requirements, resilience-oriented evaluation criteria for bid proposals, payment mechanisms that reward risk mitigation and management, and the imposition of penalties when operators fail to meet operational performance requirements or disaster readiness standards. Government can also ensure that the terms of designed contract adjustments (triggers, authority, and decision process for renegotiation) are met for parties to respond to disaster events and deliver assistance after a disaster event.

Output-based contracts can help encourage private entities to develop innovative ways to achieve required service performance, including in the area of DRM. If Requests for Proposals (RfPs) specify outputs, operators may be selected according to their capacities to effectively assess and manage project risks and determine appropriate responses to maintain the cost-performance balance of the PPP projects. Since there may be many options for inputs associated with targeted outputs, governments employing this approach must establish measurable indicators to assess whether outputs satisfy required standards. In Kenya, for example, the draft PPP manual recommends that PPP project specifications be designed on an output basis, and PPP procurement regulations stipulate that payments be linked to specific indicators.

Efforts that incentivize DRM through procurement, monitoring, and oversight mechanisms and penalty and reward systems, in combination, create stronger incentives for private developers to efficiently and effectively incorporate DRM principles and disaster readiness into project planning.

Key recommendations for policy makers are as follows:

- **Encourage private developers to formulate and implement DRM measures:**
    - Disclose disaster risks during the procurement process.
    - During the procurement process, encourage private developers to propose DRM measures as an additional basis of selection.
    - During the RfP stage, set qualitative or quantitative disaster resilience standards for private developers.
    - Consider output-based contracts to incentivize DRM innovation and reinforce resilience standards.
    - Facilitate competitive dialogue between public and private parties before and during contract negotiation to establish standards and the definition of force majeure.

- **Ensure resilience planning and design and effective contract management with independent professional assurance and technical support:**

    - Bidders may be encouraged or required to engage technical insurance specialists to guide bidding companies in procuring adequate disaster coverage, particularly since some disaster insurance products are complex.
    - Components of project proposals should be assessed and verified by an independent engineer (IE) after commercial close, during detailed engineering design, and throughout project implementation.
    - Engage the support of an IE in the event of a disaster to verify material impacts and assess claims for contract adjustment or relief and estimated recovery time.
    - If contract adjustments are deemed necessary or contractual mechanisms such as force majeure or relief are invoked, contracting authorities should engage experienced legal and technical advisors for appropriate advice and representation.

- **Design the regulatory oversight system, including penalties, rewards, and monitoring and audit, to facilitate DRM measures:**

    - Set the required engineering design standards and O&M standards such as key performance indicators (KPIs) on resilience in tender specifications to balance capital and operational expenditures over the asset lifecycle.
    - Enforce compliance with DRM requirements and contracted risk allocation arrangements by establishing an effective monitoring and audit system.
    - Monitor compliance with requirements for preparedness, insurance, and emergency response.
    - Design rewards for attainment of key DRM goals and standards.
    - Consider introducing penalties for noncompliance.

Useful Tools and Resources

Incorporating Climate Adaptation Risks to Performance Based Contracting
http://blogs.worldbank.org/transport/addressing-risks-climate-change-performance-based-contracts

BOX 2

Role of IE in Assessing Damage Loss Responsibility: Samakhiali-Gandhidham Toll Road in India

At the start of operations in 2015, the Samakhiali-Gandhidham Toll Road Project in India suffered revenue losses worth US$68,000 and toll plaza damages worth US$400,000. The damages were due to severe rainfall and flooding at the project site that led to closure of the toll plaza for more than 24 hours, thereby preventing toll collection.

Although the concessionaire invoked the force majeure clause, the IE reviewed the incident and determined that the damages and losses associated with the disaster resulted from the concessionaire's operational inefficiency. Specifically, the concessionaire had failed to follow the IE's earlier suggestion to upgrade facilities before the start of the monsoon season. Therefore, the authority did not provide a contract period extension, and the private developer bore the revenue losses.

Source: World Bank. 2018. Resilient Infrastructure PPPs – the India Country Brief.

BOX 3

Linking Payments to Disaster Risk Planning and Response in Japan

In Japan, contracting authorities have incentivized resilience building through a contracted system of payments to operators. For example, the project agreement for an education PPP in Sendai City, the School Meal Supply Center, specifies payment terms linked to recovery of services following a disruption, based on a points system. If a school meal supply service is maintained or quickly restored following a force majeure event because of the ingenuity and efforts of the operator, points that reduce the operator's compensation amount are decreased. When the Great East Japan Earthquake struck the area in 2011, the School Meal Supply Center restored service two months earlier than other affected facilities, mainly due to independent operator actions. While municipal staff had to deal with budgetary and administrative restrictions when restoring services to other affected buildings, the operator was not restricted by government budget procedures and could also leverage flexibilities in its supplier network. Because the private operator also had an economic motivation, namely the potential reduction of payment, it responded quickly to restore the facility and maintain the contracted revenue stream.

Source: World Bank. 2017. Resilient Infrastructure PPPs – the Case of Japan.

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Disaster Risk Finance and Financial

Disaster risk finance and the participation of financial institutions at various stages of the PPP project lifecycle can also support resilience in infrastructure PPPs. Risk mitigation and risk transfer measures are indispensable for both public and private parties.

A well-developed insurance market can enable public authorities and private operators to effectively transfer risks and ensure the availability of sufficient cash flows to continue operations following a disaster. The cost-effectiveness of insurance products must be carefully analyzed during feasibility study and project planning, however, as insurance costs may result in reduced profitability and undermine project viability in the absence of additional government measures to assume disaster risks. Government can support the development of insurance and reinsurance markets to develop effective risk transfer options while assuming some key risks in the interim to avoid placing excessive disaster risk on the private sector.

The global reinsurance market also plays an important role in helping insurance companies expand capacity to bear disaster risks through additional transference of risk. Beyond the insurance and reinsurance markets, disaster risks can be transferred to the capital markets through Alternative Risk Transfer (ART) products. ART products do not require claim settlement, which can facilitate prompt payment release when a disaster occurs. Catastrophe bonds (also known as Cat Bonds), resilience bonds, weather derivatives, parametric insurance, and captives are key ART products that may be available to transfer disaster risks. Some donor-funded contingent lines of credit can provide immediate liquidity when a disaster occurs.

To secure cash flows to meet additional costs incurred by disasters, it can be useful to establish government financing mechanisms at the national and local levels to fund necessary actions. Such mechanisms can enable rapid liquidity to operators to ensure continuity of service and facilitate recovery.

In addition, disaster and climate risk due diligence by lenders can help parties assess key risks and motivate private operators to incorporate resilience into PPP project plans. Comprehensive assessments by lenders can contribute to the development of bankable projects, even if private entities take on disaster risks, as the extra scrutiny can provide additional information and alleviate uncertainties that may otherwise affect commercial viability.

Key recommendations for policy makers with respect to disaster finance and leveraging the services and skills of financial institutions include discussions of both insurance and disaster finance. While decisions about insurance are often not in the hands of government in a PPP, decisions regarding insurance are discussed to inform project planning and to help governments decide where they might take action to encourage the effective use of risk transfer mechanisms. Governments can also play a key role in facilitating disaster finance arrangements to support recovery in the aftermath of a disaster.

Key recommendations regarding risk transfer and disaster finance are as follows:

- **Make use of risk transfer mechanisms, including insurance, to transfer disaster risks in PPP projects:**
    - Transfer disaster risks borne by private entities with available insurance.
    - Set terms of insurance claims, including priority of claims, to reduce uncertainty in financing arrangements.
    - Conduct a due diligence on insurance contracts to ensure that a payout will be properly made to private entities.
    - Consider developing a regional or infrastructure sectoral risk pool to enable private entities possess sufficient collective purchasing power.
    - Consider ART financial products in addition to insurance to reduce private entities' disaster risk exposure.
    - Consider waiving VAT payment on premium in the event of hardening market and subsidize high deductibles for large claims to make the project profitable and allow for dispensation of placement into the international market beyond a certain size of the project (for example, US$250 million), to avoid stacking of premium costs through several unrated insurers participating while charging participating fees and making the premium expensive.
    - Allow only rated insurers for a threshold on the value of the project to avoid distress situations in case of a large claim.

- **Prepare mechanisms to make funds available to cover the costs of emergency response and reconstruction:**
    - Develop a risk retention program (which may include specialized government reserves, a contingency budget, or reconstruction funds) and related access mechanisms to enable private operators to quickly attain funding needed to restore assets and operations.
    - Establish a regulatory framework for swift insurance claim settlements to enable quick post-disaster recovery and reconstruction.

- **Enable development of viable projects despite risks borne by private entities:**
    - Encourage financiers to conduct due diligence on disaster risks before financial close and ensure that the private entities prepare and implement a disaster risk reduction plan and a business continuity plan.
    - Enable the procuring authority and financiers to directly discuss plans to ensure business continuity and sustainability in case of significant business disruptions.

Useful Tools and Resources

Disaster Risk Financing and Insurance (DRFI) Program https://www.gfdrr.org/en/drfip
InsuResilience Global Partnership https://www.insursesilience.org/

BOX 4

Insurance Requirements in Kenya PPP Contract

Disaster risk insurance is available in Kenya to cover risks of drought and flood, among other natural hazards, in infrastructure PPP contracts. Government has implemented requirements for mandatory disaster risk insurance coverage. As extracted from a sample power purchase agreement (PPA), for example, the seller (the project company) shall "at its sole cost and expense, obtain and maintain, in full force and effect, for the periods specified in Schedule 8, the insurance policies set forth in Schedule 8, in the amounts stipulated (provided that, having regard to the level of cover generally taken out by international independent geothermal power producers acting in accordance with Prudent Operating Practice, such insurances are available on commercially reasonable terms), with reputable insurance companies. Notwithstanding the foregoing, the Parties agree that Schedule 8 sets forth minimum requirements and that the foregoing, therefore, shall not preclude the Seller from increasing the amount of coverage obtained under any type of insurance coverage referred to in Schedule 8."

Source: PwC Advisory; Extracted from a signed PPA.

/08

Resilient Infrastructure PPP: Key Lessons from Case Studies

This brief highlights lessons and recommendations from the comparative case studies in India, Japan, and Kenya to help inform governments intending to mainstream DRM into infrastructure development and PPPs, in particular.

These countries were selected because of their considerable provision for DRM in infrastructure PPP and the significance of their disaster vulnerabilities. A set of common lessons and themes could be derived from significantly different operating contexts as the case countries vary with respect to disaster risk profiles, levels of development, administrative and institutional arrangements, and dominant approaches to DRM in infrastructure PPPs. Nevertheless, several common themes have emerged that can inform PPP arrangements in other regions. This brief may be further updated based on best practices and lessons learned from other countries.

Government can play an important role in mainstreaming DRM, assuming uninsurable risks, and coordinating DRM and PPP policy. Case comparisons suggest that a strong DRM framework is likely to improve overall understanding of disaster risks for infrastructure projects and encourage direct attendance to issues of resilience in project structuring and contract design. Such frameworks also inevitably shape how well governments allocate disaster risks. Sound DRM frameworks can help governments ensure that risks are effectively assessed and available risk transfer tools and contractual options thoroughly and rigorously considered to help place risks with the parties best able to manage them. DRM frameworks also help promote the recoverability of critical services in the event of disasters and help government manage the assumption of uninsurable risks, where necessary, to make a potential PPP project viable and more resilient. This may particularly be the case for highly uncertain climate risks.

These frameworks and their associated strategies may differ significantly, however. Japan and India, for example, demonstrate two distinct approaches to allocating disaster risk. In Japan, public authorities have historically borne most natural disaster risk. As a result of accumulated PPP experience and the development of intensive risk assessment and consultative processes, however, Japan has gradually transferred disaster risks from public agencies to private operators. The early PPP market developed steadily because of the public sector's assumption of unforeseen risk, but once a large base of PPP projects was implemented, both government agencies and private operators could learn from the experiences of past disaster events and improved data to better assess and allocate risks.

In India, on the other hand, private entities often assume disaster risks. While there has been a fairly balanced allocation of disaster risk between the public and private parties from the outset, Indian developers have suffered significant losses until insurance claims were settled. These loss experiences, among other factors, could decrease private interest in PPPs as more frequent disaster events affecting PPP projects are anticipated. The Indian experience suggests that governments should carefully balance efforts to incentivize risk reduction and acceptance on the part of the private sector with the competing demands of developing a robust PPP market, which may require government to assume highly uncertain risks.

All these cases also suggest that there is much room to improve the coordination of DRM and PPP policy. Relevant specialized government agencies, including PPP units and agencies charged with overall coordination of DRM, can play key roles in integrating resilience principles into PPP policies.

Common definitions and understanding of climate and disaster risks between contracting authority and private developer are important: The definition and characterization of disaster risks applied in contracts are often still ambiguous. This may hinder private developers and government from preparing necessary emergency response and business continuity measures, complicate contracting, and limit the attractiveness of a PPP to potential private sector partners. The Japanese case studies, in particular, show that the lessons learned from previous projects have been applied to determine a clear definition of force majeure by applying quantitative criteria to characterize the severity of disasters. In addition, DRM legal frameworks at the national and regional levels are updated frequently based on the lessons learned from comprehensive study and inferences generated from disaster experiences.

While it may not be possible to employ a probabilistic risk-based approach to predict the effects of climate change over the design lifespan of an infrastructure asset, procuring authorities can adopt low-regret, adaptive strategies. These can be informed by VfM analyses of robust engineering designs and supported by sound performance standards, flexibility in PPP contracts, and use of insurance and other disaster risk financing tools. Decisions on risk reduction measures will inevitably depend on the infrastructure's vulnerability, criticality, and exposure to the potential impacts of climate change.

Government and private sector learning can improve future PPPs: Disaster risks become more apparent after countries experience natural disasters. All the case studies demonstrate that governments can successfully incorporate lessons from past disasters to improve future project planning and resilience to similar impacts. For instance, earthquakes are the most common and high-impact disaster events in Japan. Japan has developed clear definitions of earthquake force majeure events with seismic intensity tied to response terms.

Government, market, and sectoral contexts shape responses to disaster risks: The case studies are suggestive of some apparent differences in handling disaster risks in PPP across countries. These differences can be attributed to several factors, including the fiscal status of government, the prominence of DRM on the political and bureaucratic agendas, and the maturity of the PPP market. The fiscal status of a government affects the availability of funds for risk reduction investments, emergency response, and recovery that may be borne by the government, which inevitably constrains options available to government to manage risks. For instance, if a public entity is fiscally constrained, it is unlikely to bear high disaster risks. If this is a requirement to make a potential PPP viable, the project may no longer be bankable.

Moreover, government attention to DRM, in general, is likely to affect the capacity to integrate DRM considerations into PPP planning. If a country lacks a basic legal framework on DRM, the processes and legal requirements that focus attention to consideration of disaster risks in PPPs are likely to be limited. Such countries may not proactively assess the levels of disaster risks they face due to lack of data and capacity for effective analysis. Therefore, site-specific climate and disaster risk assessment during the early planning stage would be increasingly important to define the resilient engineering designs and KPIs for risk-informed O&M.

The maturity of the PPP market, including the degree to which risk allocation arrangements have been market tested, influences how willing private developers will be to participate in PPPs in hazard-prone areas. Private participation is likely to improve with developed and tested risk transfer products (for example, insurance) that cover major and frequent natural disasters with a rational range of premium fees or in the presence of a developed reinsurance market.

Sector characteristics will also influence risk allocation. A sector's importance to economic activity, national security, environmental quality, and public safety influences the risk government is willing to bear. Moreover, technical complexity, sector profitability, and the ability of operators to control revenues (for example, by the right to set user fees) all have an impact on operator willingness to bear disaster risks. Public authorities are often best positioned to bear disaster risks for socially or economically critical infrastructure projects, particularly if these projects are characterized by low profitability.

Indeed, a complex and unique combination of factors affects decisions regarding risk allocation, and there is no single rule to determine perfect risk allocation. Experiences from past disasters can offer policy makers insights, however, to formulate better frameworks and measures to incorporate disaster resilience in future PPPs. By extending case comparisons and continuing to document lessons, governments and development partners can, at the very least, ensure that the most important questions regarding disaster are considered in PPP arrangements. With more experience, effective and rigorous risk assessment techniques, robust engineering designs, disaster risk financing tools, and efficient risk allocation arrangements may be customized and applied to improve the resistance and recoverability of infrastructure PPPs.

World Bank DRM Hub, Tokyo

The World Bank Tokyo Disaster Risk Management (DRM) Hub supports developing countries to mainstream DRM in national development planning and investment programs. As part of the Global Facility for Disaster Reduction and Recovery, the DRM Hub provides technical assistance grants and connects Japanese and global DRM expertise and solutions with World Bank teams and government officials. The DRM Hub was established in 2014 through the Japan-World Bank Program for Mainstreaming DRM in Developing Countries – a partnership between Japan's Ministry of Finance and the World Bank.

GIF

The Global Infrastructure Facility (GIF) is a global collaborative platform that facilitates the preparation and structuring of complex PPPs in infrastructure and the mobilization of capital from the private sector and institutional investors.

GFDRR

The Global Facility for Disaster Reduction and Recovery (GFDRR) is a global partnership that helps developing countries better understand and reduce their vulnerabilities to natural hazards and adapt to climate change. Working with over 400 local, national, regional, and international partners, GFDRR provides grant financing, technical assistance, training, and knowledge sharing activities to mainstream disaster and climate risk management in policies and strategies. Managed by the World Bank, GFDRR is supported by 36 countries and 10 international organizations.

PPIAF

PPIAF provides technical assistance to governments to support the creation of a sound enabling environment for the provision of basic infrastructure services by the private sector. PPIAF also supports the generation and dissemination of knowledge on emerging practices on matters relating to private sector involvement in infrastructure.

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