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FINANCING GREEN TRANSITIONS

Edited by Samir Saran

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Financing Green Transitions: Commitments, Capabilities and Capacities

Samir Saran, President, Observer Research Foundation

More than three years after the Paris Agreement was finalised at COP21, it is evident that the developing world is unlikely to receive even the modest amount of US\$100 billion annually in climate finance by 2020. This is primarily a result of the collective failure of the developed world to meet their moral and real climate obligations that pre-date the Paris Agreement. This lack of finance for climate action is exacerbated by the fact that the international financial community—banks, asset managers, investors and capital markets—have failed to align their operations with the goals of the Paris Agreement. The involvement of international financial investors, both private and multilateral, in financing green transitions in developing countries has so far been feeble, sporadic and arbitrary. Unless these resources can be leveraged to cater to the development needs of emerging economies, there is a real possibility that the green transitions that we all seek will be incomplete and mostly underwritten by the world's poorest citizens.

For the past two years, ORF and the MacArthur Foundation have attempted to create a new framework to ensure that the global financial community better responds to the imperatives of the Paris Agreement. Our research acknowledges that official aid and grants are insufficient to meet the burgeoning energy and infrastructure needs of emerging economies. There is no doubt that we require new financial instruments and pipelines to support sustainable development in much of the world. This publication, comprising of 11 policy essays on the subject of climate finance, discusses this objective through multiple lenses. It is a culmination of our efforts to work with a global network of experts and stakeholders to identify

bottlenecks and provide new solutions to ensure that emerging economies can access finance to meet their green development goals.

Our series on financing green transitions has largely focused on India, and for good reason: It will be the first large country that must transition to a middle-income economy in a fossil fuel-constrained world. India is also constricted by the same political, regulatory and financial challenges that confront much of the developing world. Given the weak efforts of the developed world to assist the developing countries so far, India has had to chart a path largely through its own economic and financial arrangements. Therefore, an assessment of India's capacity to now leverage international financial flows and its ability to undertake a low-carbon transition may well provide a reliable template for developing countries to emulate.

Through 11 essays, we explore three broad themes: the role of international investors and institutions; India's own development policy choices and lessons therein for other developing countries; and the role of human capital in climate-resilient investment.

Our first set of essays analyses the behaviour and financial practises of international financial institutions, investors and credit rating organisations. In "An Incomplete Transformation", Mihir Sharma argues that Multilateral Development Banks have failed to create bridges between private capital and clean energy/climate resilient infrastructure demands in developing countries. He calls on MDBs to adapt to developing world priorities, crowd-in private capital, and streamline operational activities in emerging economies. In "Financing Climate Resilience", Vikrom Mathur and Aparna Roy highlight the bias of international investors towards investing mostly in mitigation efforts. Conventional wisdom in the private sector holds that the costs of adaptation and resilience should be borne by governments. Taking a different approach to the problem, Mathur and Roy offer solutions focused on commercial and business opportunities. In two pieces, "Rating Resilience" and "Ratings for Renewable Energy", Aled Jones studies the limitations of current literature and practices relating to credit rating of infrastructure projects and renewable energy projects and proposes a more holistic framework of risk metrics for both renewable energy and climate resilient infrastructure. Finally, in "The Political Economy of Basel", Mihir Sharma outlines how the Basel norms have been designed to respond to the interests of a select group of developed nations. He argues that by prioritising macroeconomic stability and implementing new liquidity restrictions, these actors have failed to consider adverse implications on cross-border flows, especially with regards to long-term green investments.

The next set of essays focuses on India's domestic challenges, particularly in its infrastructure and urban development policy and its efforts to transition to a low-carbon economy. In "PPP model, regulatory oversight and private financing: Evolutionary trinity of India's infrastructure", Gautam Chikermane offers a comprehensive historical account of the political economy of India's infrastructure policy, documenting the many failures that have plagued it. Given that a stable infrastructure policy will have significant implications for green investment

choices, Chikermane's study of India's policy failures provides valuable lessons. In "Financing Urban Infrastructure for an Evolving India", Pritika Hingorani, Sharmadha Srinivasan, and Harshita Agarwal examine the reasons for the lack of private-sector involvement in India's climate-resilient urban infrastructure. They analyse the current regulatory regime for urban infrastructure in India and provide a set of solutions, advancing both public and private sector participation in the future. In "Moving from Growth to Development: Financing Green Investment in India", Neha Kumar, Prashant Vaze and Sean Kidney explore new financial instruments that India can employ to finance its green infrastructure needs. They outline how India can more effectively scale its green bonds market, leverage international debt capital markets, and harness blended finance to achieve this objective. Finally, in "India and the World," Aparajit Pandey and I outline three key structural barriers that threaten to undermine India's rapidly growing green energy sector: the state of its distribution companies, underdeveloped financial markets and inflexible international credit and risk assessment practices. Offering case studies from India's state and municipal level policies, we argue that India's ability to succeed in its low-carbon transition will open new pathways for emerging economies around the world.

In our final set of essays, we examine the role of human capital in enabling greater green investment, focusing on leadership and gender. In "Pay for Sustainable Growth", Charanjit Singh, analyses the executive pay of 31 of India's top companies showing that by linking management compensation to short-term performance objective, companies are failing to integrate sustainability objectives into their long-term vision. The chapter proposes a restructuring of the private sector's approach to executive compensation, focused on long-term sustainable economic growth. Lastly, in "Gender and Climate Finance," Vidisha Mishra posits that even though women and marginalised groups are likely to be more exposed to climate change related risks, they are severely underrepresented in the investment and regulatory classes. Her essay then unpacks the opportunities and benefits of meaningfully building gender concerns into climate finance mechanisms.

Our contributors have attempted to explore the reasons behind the significant shortfall in private finance in relation to low-carbon investments. They have also collectively offered solutions, both domestic and international, with regards to the flow of finance for climate projects. The success of these solutions, however, will be predicated on some boundary conditions that developing economies and the international financial community must meet.

First, developing countries must reclaim the power grid. The large-scale subsidisation of power in the developing world has created significant distortions in energy use, pricing and policy. State-level reform in India suggests that splitting the electrical grid for agricultural and non-agricultural sectors, implementing a credible metering system and providing subsidies as direct benefits can have significant positive effects on the power sector. Without a viable grid, green investments are likely to remain unviable.

The second is to build capacity amongst international investors to understand risk and opportunity in developing states. There is generally a bias stemming from lack of knowledge (information) and capacity (human resources) to assess risks in emerging economies. This ultimately translates into an inability to understand the economic landscape of recipient countries. Further, as one of our authors has highlighted, there are few institutional attempts at gendering climate investments and finance. A lack of female representation in the investor community, especially from the developing world, invariably means that the concerns and voices of the most vulnerable are ignored as financial plans are scripted.

Third, developing countries must build innovative policy tools to leverage new financial instruments and mechanisms. Currently, regulations related to debt and equity markets restrict the flow of international capital into climate action projects. Emerging economies must co-opt their financial sector in the fight against climate change. Financial markets that allow for debt financing and locally issued green bonds for example create a diverse set of instruments that different types of investors can rely on. More ambitious measures can include the creation of a “green investment bank,” which allow the crowding in of private investment in green assets.

Finally, there is a new imperative to overhaul regulatory systems around the world, both in recipient and investing states. Vast pools of money are held by multiple categories of investors, such as pension funds and insurance companies. However, existing regulations limit the ability of fund managers to invest in climate related projects. Further, international credit rating agencies reassess the methodology for assessments of green projects in developing countries. And perhaps most importantly, there is an urgent need to review the current set of Basel Accords as well as the next iteration of Basel IV accords. The macro-prudential regulations were designed to create a more risk-free international banking system but have unintentionally stymied the ability of the financial sector to contribute to climate resilience. The banking community must acknowledge that planetary risk is the largest systemic challenge to financial stability and that mitigating such risk is the most prudent practice.

While these solutions are far from comprehensive, they address some of the most persistent structural barriers to supplying and accessing climate finance. ORF and the MacArthur Foundation will continue to explore new ways and means to ensure that developing countries can access financing to pursue their low-carbon transitions. We will also continue to study India’s own financial, technological and governance solutions in the hope that these experiences can benefit other countries and communities. We hope that the insights presented in this book will inform academics, business leaders and policymakers in their efforts to better understand the importance of the global financial community finally signing the Paris Agreement.

An Incomplete Transformation: Multilateral Development Banks and the Green Infrastructure Gap

Mihir S. Sharma, Senior Fellow, Observer Research Foundation

Introduction

International development finance architecture has long been underpinned by an interlocking system of multilateral development banks (MDBs) that were conceived of as one of the primary conduits for fund flows from the developed to the developing world. Over time, these MDBs acquired a disproportionate level of influence on developing-world economic policy choices, while failing to sufficiently democratise their governance structures. However, as the human resource pool from which the MDBs drew their decision-makers eventually became more democratised, they grew more responsive to the requirements of the developing world. The threat to MDBs' functioning, however, has multiplied in recent years, driven by various processes that are examined in section one of this brief. While it is too soon to suggest that MDBs will be rendered archaic by the changing contours of global development finance, these growing pressures on traditional MDB functioning have led to some recalibration of the objectives of many MDBs. Some of these developments are examined in sections two and three.

The question, however, is the degree to which a new focus for the MDBs as catalysts for private finance in climate change-sensitive development infrastructure will be effective. There remain various obstacles for the MDBs, some of them beyond the MDBs' control. Sections 2 and 3 of this brief provide an outline of these hurdles, and lay out the further study required of MDBs' objectives, strengths and threats going forward; Section 4 examines possible dangers in the MDBs' current reorientation to meet climate goals. The focus throughout the brief is on the political and

politicised challenges that need to be overcome to enable the transformation of MDBs into suitable instruments for energising cross-border capital flows into green infrastructure in such a way that Paris Agreement targets are met alongside each country's development goals.

A Low-effort Equilibrium

Multilateral development banks (MDBs)— most importantly the World Bank (WB) but also regional banks such as the Asian Development Bank (ADB), the African Development Bank (AfDB) and other development finance institutions (DFIs)— have long been the pillars of financing for global development.

As the decades passed, there were increasing demands that MDBs “democratise” their governance by giving developing countries a greater say in their operations. This pressure was moderated by various actions of the MDBs themselves. For example, they became more responsive to social-sector demands from non-governmental organisations (NGOs) in both developing and developed countries. (In India, the World Bank's approach to protests surrounding the Sardar Sarovar dam on the Narmada river, in which it was more responsive than state or central governments, is illustrative.) Meanwhile, the MDBs' catchment area for staff widened over the years, incorporating many members of developing-country elites. These staffers would informally represent the concerns of developing-country governing classes in internal MDB discussions, ensuring that MDBs made their functioning more broad-based to a degree, if not their formal governance structures.

Eventually, a comfortable equilibrium developed that satisfied all the various interest groups involved: the MDBs' financiers (developed-world governments), the MDBs' staff, and governments of countries receiving the MDBs' funds.

In this equilibrium, MDBs focused on disbursing loans directly to public sector authorities in developing countries. These loans would be provided at concessionary rates, and developing-country governments used them for designated projects, which would also be monitored by MDB staff. All concerned were comfortable: MDB staff, because the process was easily manageable and required little specialist skills; the net donor states, because MDB boards could be satisfied that lending was suitably restrained, parsimonious, and did not benefit private-sector players directly or unduly; and developing-world governments, because they had control over the funds flowing into their countries from the MDB, and their own public-sector institutions were the primary beneficiaries. While the pitfalls in private financing for infrastructure, including through such models as public-private partnerships or PPPs, have become clearer in recent years, it is vital to keep in mind that public investment also has inherent problems of its own. In particular, it is wasteful of scarce resources; the International Monetary Fund (IMF) estimates “average inefficiencies” in public investment processes at around 30 percent.¹

It is important to note that this is not in fact how the Bretton Woods DFIs were imagined at their inception. Christopher Humphrey and Annalisa Prizzon² quote US Treasury Secretary Henry Morgenthau, who was an important figure at the time

the post-War development consensus was being created, as envisioning a different primary task: “The primary aim of such an agency should be to encourage private capital to go abroad for productive investment by sharing the risks of private investors in large ventures ... The most important of the Bank’s operations will be to guarantee loans in order that investors may have a reasonable assurance of safety in placing their funds abroad.” Yet it is clear that this is not, in fact, how things have turned out in practice. Humphrey and Prizzon point out that, in 2013, only 1.7 percent of the lending approved by DFIs took the form of various guarantees. Thus the first, increasingly pressing, problem: MDBs have become too comfortable with concessionary loans as a method of development finance.

The second problem that began to press over time was that MDBs were not living up to their initial commitment to finance infrastructure. According to Nancy Lee of the Centre for Global Development (CGD), the total commitments of MDBs (sovereign and non-sovereign) are about US\$116 billion per year, of which infrastructure funding is only about \$45 billion.³ This comes at a time when private financing for infrastructure is declining. The World Bank’s annual report on private participation in infrastructure found that the commitment of resources with private participation in infrastructure in 2016 was the lowest in 10 years.⁴ From \$210 billion in 2012, such investment had come down to just over \$71 billion in 2016. The World Bank argued that this was driven in particular by steep declines in the number of projects being financed in three major emerging economies: India, Turkey and Brazil.

Nor is it likely that, given tightening monetary policy and increasing returns in the developed world, this pattern of shrinking will be easily reversed over the next few, crucial years. In other words, private financing of infrastructure was and is falling off, but MDBs were and are unable to step up and fill the gap—their lending seems as susceptible to business cycles as was private investment. Although the Inter-Agency Task Force on Financing for Development has claimed that MDBs were able to play a quick counter-cyclical role immediately after the global financial crisis of 2008, this was clearly neither sustained over time, nor properly directed.⁵ Obviously, MDBs were not performing as designed.

These two problems became particularly potent barriers to MDB functioning as the scale of global poverty decreased in recent decades and state capacity and aspirations in the developing world increased. The binding constraint on further growth in these economies was the paucity of world-class infrastructure. MDBs and DFIs were clearly under-capitalised if they were to fill an infrastructure spending deficit that grew to \$1-1.5 trillion a year. The ADB, for example, can produce a meagre \$13 billion annually in new loans.⁶ Yet there is little or no appetite among the principal shareholders of existing MDBs to increase the capital available. Nor is it obvious that any such appetite will develop going forward; in fact, pressure is building domestically in many source nations— particularly the US— to focus on expensive infrastructure expansion locally.

The conclusion seems inescapable: the existing model of MDB activity is failing to adapt to the needs of the 21st century. To this existing crisis of MDB finance, two additional wrinkles have been added: growing concern about climate change, and

the growth of investible surplus capital in the People's Republic of China.

The imperatives of climate change require cross-border infrastructure finance to not only consider the previous constraints on its operation such as currency fluctuations, sovereign risk, contract enforcement, and long tenures, but also to examine the sustainability of the assets so built and whether they feed into the broader attempt to control and respond to global warming. On one level, this means that there is an additional objective for MDBs to take into account, when they are already struggling with multiple, sometimes contradictory aims. Their lending is supposed to be safe, create broad economic externalities, avoid crowding out private investment, meet target country requirements, adhere to governance standards, and avoid alienating NGOs. Now the global consensus against carbon also has to feed into decision-making, creating an additional “co-benefit” that MDB credit has to address. Going forward, there are only two likely responses to this: paralysis or over-reaction. Paralysis is visible in the unwillingness to increase the capital on call for most MDBs, and over-reaction in pledges such as was recently on offer from the World Bank to stop any and all support of carbon-based upstream energy projects. The dangerous consequences of this will be examined in Section 3.

The emergence of the People's Republic of China as a major player in development finance has both a constructive and a disruptive side to it. Increasing funding for “hard” infrastructure globally is a major political priority for the current leadership in Beijing, as seen from the centrality of the Belt and Road Initiative (BRI) in its foreign-policy messaging. For many observers, this is not a negative development. Indeed, most countries straining to attract capital into infrastructure are clearly willing to open themselves to the benefits that could, from an optimistic viewpoint, accrue from access to PRC funds. However, the disruptive effects are also worth considering, especially as they will make the transformation of existing MDBs more difficult.

For one, going forward, attempts at coordination between MDBs will be complicated by the geo-political competition underlying Beijing's creation of an alternative development finance architecture anchored on its own multilateral development bank, the Asian Infrastructure Investment Bank (AIIB). Second, concerns have understandably been expressed about a “race to the bottom” in terms of governance and political standards associated with MDB activity if the existing DFI complex begins to compete with the new Beijing-centred DFI complex as a source of finance.⁷ Third, the broad division between the two DFI ecosystems threatens any nascent cooperation and universalisation of standards, templates and databases relating to project finance.

The MDBs' New Aspirations

The leaders of MDBs and their shareholders have not been completely quiescent in the face of this growing challenge to the MDBs' role as the primary pillars of global development finance. In some cases, their responses have gone in the wrong direction, but in others, they have tried to realistically bridge the gap between

what needs to be done and what can be done.

On the positive side, it is clear that a new consensus is growing around the definition of the MDBs' role. Several methods of closing the lacunae identified earlier in this brief are being examined. The MDBs' "joint declaration of aspirations" (JDA) in 2016 set targets for infrastructure lending, for example, that they subsequently declared were either close to being met or had been met. The declaration sought to refocus the MDBs' efforts towards infrastructure, by methods "including formulating quantitative ambitions for high-quality projects, encouraging multipartite cooperation financing models, catalysing private resources, fostering collaboration between new and existing MDBs, and strengthening project preparation to improve quality and bankability".⁸ By the end of 2016, the MDBs claimed that the quantitative ambitions at least were being met.⁹

The other aspects of the MDBs' aspirations are less easily quantifiable and thus harder to evaluate. For one, consider the word "quality" before infrastructure in the above listing. "Quality" is defined in a particular way in the JDA document, with the first requirement being sustainability over the life-cycle of the infrastructure asset, including climate resilience and carbon mitigation. But the word, in the context of international infrastructure investment, also has a specific undertone: there are often concerns that Chinese-built infrastructure is sub-standard, and thus other larger builders and funders, especially the Japanese agencies, emphasise "quality" in their own pitch to developing countries. This is only one example of a possible geopolitical pitfall in the path to modernisation and coordination of MDBs' goals and operations.

Two specific directions of the MDBs' new focus require closer examination. The first focuses on the pipeline of new projects in the developing world, and consists of a move from MDBs' role of simply funding projects, to curation and risk mitigation; and the second is their stated ambition to effectively mobilise resources from the private sector, including in the developed world.

The first direction makes the reasonable assumption that there is suppressed demand in the global North, especially among institutional investors, for long-tenure investments with the appropriate risk-return profile. If institutional investors can help create a "pipeline" of such projects, through proper preparation, guarantees, or co-financing, this suppressed demand can help fill the \$1-\$1.5 trillion investment gap. The end-2016 report on how the MDBs have moved towards addressing the goals of the JDA, identifies a host of new attempts to create a project pipeline: "Therefore, in addition to MDBs' traditional portfolio of products for infrastructure development such as non-sovereign financing windows, guarantees and other co-financing and risk-mitigation instruments, and new specialised project preparation, the MDBs have come together to support the G20 Global Infrastructure Hub and the World Bank Group-hosted Global Infrastructure Facility, which will support greater collaboration in preparing and structuring complex infrastructure projects to attract long-term financing from private investors. The MDBs are strengthening the infrastructure pipeline through project preparation facilities (PPFs). These include the Inter-American Development Bank's (IDB) Infra Fund, AfDB's New

Partnership for Africa's Development's (NEPAD) Infrastructure PPF, European Investment Bank (EIB) hosted initiatives such as the Arab Financing Facility Technical Assistance Fund (co-managed by Islamic Development Bank and IFC); European Bank of Reconstruction and Development's (EBRD) Infrastructure PPF; ADB's Asia Pacific PPF, as well as AfDB's Africa50 Initiative, which will focus on both project preparation and project finance.”¹⁰

The World Bank Group has rhetorically committed itself to a “cascade” approach to its operations, which one senior WB official described thus: “To better sequence our interventions, we’ve developed a ‘cascade approach’ to investment decision-making to encourage private sector participation, while leveraging and preserving scarce public dollars for critical public investments. If commercial financing is available, that is the preferred course. If it is absent, we try to address market failures. If those efforts are unsuccessful, we use risk instruments and our own matching capital to try to encourage private investment. Finally, if absolutely necessary, then public and concessional financing will be used.”¹¹ Some of this rhetorical commitment has been matched by the direction of MDB finance, with much of the \$75-billion “18th replenishment” of World Bank funds for the poorest countries, or International Development Assistance 18 (IDA18), being used to set up a joint venture between three World Bank Group entities— the Multilateral Investment Guarantee Agency, the International Finance Corporation, and the International Development Association—that focuses on risk mitigation, guarantees, and blended finance.

Overall, this is a welcome development. The MDBs’ extensive experience in most developing countries, their superior knowledge of local conditions and decision-makers, and their political heft all mean that they are in an excellent position to serve as mitigators of risk, or preparers of developing-world projects for private developed-world finance, or both. This is a vital new direction, and it has clearly been taken on-board at the strategic level by MDBs. But the implementation hurdles are also visible in the paragraph quoted above from the end-2016 inter-agency report. There are too many different and overlapping attempts, reflecting the multiple priorities of the DFIs involved. Information sharing between the MDBs is marginal; it is reportedly difficult even to get different silos of a single institution or group to share information about observed risks. Indeed, the inability to share information has always been a problem with MDBs, leading in the past to competitive subsidies, for example; but in an era in which MDBs are supposed to focus on risk mitigation, it takes on a new and sharper edge. In addition, pooling information and resources will enable better risk diversification. It is noteworthy that this happens even as many organisations in the existing DFI complex share the same influential shareholders.

The Global Infrastructure Hub under the G20 is one mechanism that is supposed to help overcome these issues, but the listing of projects on the Hub seems to depend entirely on the enthusiasm of individual decision-makers within specific national or local governments in the developing world. In December 2017, for example, only three projects from India were listed on the Hub, all of them from the Railways Ministry in the Union government. It is not yet seen as a core duty of any operational

head of an MDB in a developing country to work with the different local agencies involved in supervising and bidding out infrastructure projects, and raise those project proposals to the level required for listing them on this proposed project pipeline. Moving from the strategic to the functional is proving to be a problem.

The conclusion is clear: while the MDBs' strategic commitment to altering their functioning may well be genuine, and is a step in the right direction, the operational impact of this strategic decision will be minimal unless it is followed up with specific actions to incentivise its staff.

Building a Closer Relationship with Private Capital

Similar barriers exist in the MDBs' attempts to move in the second and related direction – towards becoming catalysts for private finance. Acting to explore risk mitigation requires a close understanding of the nature of the destination countries for investment, but shifting focus to catalysing private investment also requires MDBs and DFIs to understand the incentives and requirements of private sector actors.

As with the replacement of risk mitigation by direct lending as the primary instrument for MDBs early on in their history, the distance that most DFIs maintain from private capital is the direct opposite of how they were originally envisaged. Humphrey and Prizzon point out that “the World Bank was viewed with considerable suspicion by the New York financial community” when it was first launched, which incentivised MDBs to move away from creating products to appeal to the financial markets. This dynamic has been intensified by the increasingly fast pace and specialised requirements of modern finance, to which the tightly controlled and slow-moving MDBs have been unable to adapt in most cases. One exception has been the world of guarantees for trade finance, which provide a useful model for the development of other products and services by MDBs that can appeal to the private sector while meeting destination-country development objectives. The European Bank for Reconstruction and Development (EBRD) introduced quick turnover approvals for trade finance guarantees—in many cases within two days—over two decades ago. Such approvals did not need to be taken up to the MDB's board for approval on a case-by-case basis. This solves at least one part of the problem that hinders cooperation between MDBs and private finance.

There is a stark difference in treatment between guarantees for trade finance and for other MDB focus areas. There continue to be major structural barriers to the growth of guarantees as a replacement for concessional loan finance as the method of choice for MDBs. Nancy Lee of CGD points out that guarantees are essentially treated identically to loans when it comes to accounting and provisioning at MDBs, although in fact they have a significantly lower actual risk. Meanwhile, guarantees involve higher levels of effort for MDB officials, since there are two parties to negotiate with: private capital, and the project promoter in the developing country. Given the equal book risk and the greater organisational input required, MDB staff have clear incentives to de-prioritise guarantees and stay within the existing, low-risk/low-outcome equilibrium. The instruments themselves

as designed by the MDBs are considered too complex by investors, and MDB operations too bureaucratic; Lee quotes a Convergence study saying that only 12 percent of blended finance deals involve guarantees or insurance, and points out that an even lower proportion, below six percent, of World Bank Group deals involve guarantee structures or other risk management instruments.

Essentially, MDBs will have to accept that a part of their duty is to handhold private capital in geographies that the latter finds intimidating or complex. This will require willingness on the part of MDB boards to take on greater risk, as well as to accept that they are working not only for governments but also for private capital. The current arms-length relationship with private capital may be comforting and easier to manage or supervise, but it also means that MDBs are failing in their core aims of increasing the access to funds for a broad segment of projects and countries. In other words, in creating financial products that serve to catalyse the cross-border flow of funds to the sort of infrastructure projects required in the developing world, MDBs will not only have to take into account their own incentives and the overall requirements of the destination countries for the funds, but also accept that they are working to serve the profit motive of private capital. Their resources will not only underwrite but also ameliorate the risks being taken by private players—not an easy psychological transition for them to make. However, it is one that is deeply necessary. Observer Research Foundation’s work on the structure and sociology of Western institutional investment reveals that a major barrier to cross-border capital flows into climate-resilient infrastructure is the lack of expertise on other geographies that such investors have in-house.¹² MDBs have such expertise; they will need to help expand the capacity of private capital to make the right choices in markets that these funds and investors find opaque.

In short, MDBs will have to move from lending to risk amelioration; and from amelioration to intermediation. They will have to serve, in fact, as real banks –intermediaries between the real pools of capital and the most productive and important destinations for those savings.

Meeting Local Priorities on Climate Action

The growing centrality to development finance of the carbon control consensus, while welcome on several levels, is nevertheless being operationalised in a manner that threatens not just the goals that the MDBs have set themselves, but also the spirit of the Paris Agreement and the broader fight for sustainable development. As an example, consider the declaration in early December 2017 that the World Bank will cease financing, from 2019, any and all projects related to oil and gas exploration and extraction. This is an example of exactly how poorly constructed the MDB response to the climate action agenda has been. Operationally, the climate agenda plays a negative rather than a positive role in MDB actions. Rather than as an effective stimulus to raise its direct financing of sustainable energy projects worldwide, it is a cause of constraints on financing projects that do not meet carbon mitigation parameters set in the global North.

How does such action fit into the structure of the 2015 Paris Agreement on

climate change? The explicit reason that the Bank gave for this decision is that it was meant “to help countries” meet the targets that they had set as part of the Paris Agreement. Yet the underlying spirit of the Paris Agreement was clear: it was to allow sovereign nations to plan and implement their own paths to the needed controls on carbon emissions, while respecting the energy needs of their populations during the transition. Imposing on these sovereign choices by ending funding unilaterally is a clear violation of the spirit of the Agreement. It is also unnecessary; the focus of climate action should be on scrutinising and aiding the implementation of each country’s Intended Nationally Determined Contributions (INDCs).

Finally, what will be the outcome of such unilateral action by existing MDBs? It could be argued, given recent history, that projects stranded by such decisions — this particular decision might create stranded assets in Egypt and Mozambique — will turn to alternative sources of development finance, and in particular the pool of investible capital controlled by China. In the absence of commitments by the Beijing complex of DFIs to climate-related monitoring of its investments, it is hard to see how exiting such projects will lead to an improvement in standards.

What will certainly be a negative going forward is if, as part of an over-reaction to the introduction of climate issues as co-benefits, MDBs exit from projects that create institutional capacity within countries to regulate, negotiate and scrutinise carbon-related projects. The December decision by the World Bank threatens a \$29-million IDA credit to Senegal for this purpose, aimed to “ensure Senegalese oil and gas development projects take place in an environment inductive to private sector investments aligned with the public interest”.¹³ It strains credulity to suppose that extraction from any new discoveries of oil and gas resources off the coast of Senegal will in any way be affected by the lack of MDB funding for state capacity. In all likelihood, what will be affected instead will be the weight given to public concerns about sustainability, and to the fit between exploitation of these resources and Senegal’s INDC.

A pattern of such actions will serve to reinforce the notion that MDCs are repeating in a more climate change-conscious age the errors many hoped they had begun to leave behind in the 2000s: namely, a refusal to consider the domestic priorities and concerns of destination nations. DFIs were close to defining themselves as sources for catalysing private investment into the projects determined as important by developing-world governments. These projects would be chosen keeping in mind those countries’ commitments to the Paris Agreement and the Sustainable Development Goals. This important redefinition is under threat if an attempt to curry favour with some influential factions in donor countries distorts the macro choices made by the MDC governing complex.

Conclusion

If climate-resilient infrastructure is to be built that addresses the need to meet the Sustainable Development Goals and underwrites countries’ efforts to keep their Paris Agreement timelines, the development finance architecture must change.

Existing and future committed resources will not be enough if DFIs operate as they always have. Rather, a clear commitment to focus on creating a bridge between private capital and “quality” infrastructure in the developing world is essential. It is important and welcome that a rhetorical commitment to this re-orientation of the current DFI complex has been made.

However, this strategic commitment must be matched with an understanding of what else must change. In particular, it should be noted that the crucial gap in developing countries that prevents them from attracting private capital to their infrastructure projects at the scale required is the inability on their part to design, monitor, de-risk and independently evaluate projects. Filling in the information and capacity gaps is thus low-hanging fruit — but it will require re-orientation of MDB operations on the ground, and not just of their mission statements. Changes will also be needed to the functioning at board level; they should not waste time on the evaluation and approval of individual projects, but on setting the overall parameters that middle-level officials can use. This will help reduce the “bureaucratic hurdles” that private investors see as a major stumbling block to doing business with DFIs.

Two other changes to the strategic direction of the existing DFI complex are required, if it is to stay within the spirit of the Paris Agreement and avoid geopolitical disruption. A subordination to local-government development objectives should be internalised at all levels of existing DFIs; if nothing else, this is a crucial step to de-risking any project and insulating it from local political currents. Second, given that additional capitalisation is unlikely at any scale, MDB boards should at least move away from their fear of risk and of close relations with private capital. Obviously, transparently safe lending is not why DFIs were set up. Nor is it in keeping with the new aspirations embodied in the 2016 JDA. MDBs need to restructure their human resources, their internal incentives, and their local operations to achieve a particular double-sided matching. The financial instruments they offer must subordinate themselves to developing-country development goals and priorities, and they must be designed to be accessible and simple enough to be taken up by private finance, and in close co-operation with the of building green infrastructure and meeting private sector. If this is done, the broader aims of the Sustainable Development Goals will be met.

Financing Resilience

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The Adaptation Gap

Over the past decade, the impacts of climate change on human and natural systems are being felt with severity across the world.¹ The imperative to build climate resilience – the capacity of communities and economies to cope and adapt to ongoing and likely future changes—is greater than ever before. In 2015, the 21st Conference of Parties (CoP) agreed to the Paris Agreement, which was designed to limit global warming to well below 2°C, in order to avoid dangerous climate change.² However, while global measures to mitigate climate change have accelerated over the past decade, scientists believe that “[e]ven if GHG emissions were to stop immediately, the average temperature will continue to rise, as the life of carbon dioxide in the atmosphere is more than 100 years.”³ Therefore, as critical as mitigation is, equal if not more priority and attention needs to be focused on building resilience.

While, historically, developed countries have been responsible for a bulk of the emissions that have led to climate change, developing countries such as India with limited adaptive capacities are most vulnerable to climate impacts. The ‘need for adaptation’ has been defined by the United Nations Environment Programme (UNEP) as “the difference between actually implemented adaptation and a societal set goal, determined largely by preferences related to tolerated climate change impacts, and reflecting resource limitations and competing priorities.” Resilience and adaptive capacity are shaped by access to finance, technology and knowledge.⁴

Global annual cost estimates (USD Billion) for developing country regions and sectors 2010-2050

Region	US\$ Billion	Sector	US\$ Billion
East Asia & Pacific	17.9	Infrastructure	13.0
Central Asia	6.9	Coastal zones	27.6
Latin America & Caribbean	14.8	Water supply and flood protection	19.7
Middle East/ North Africa	2.5	Agriculture, forestry, fisheries	3.0
South Asia	15.0	Human health	1.5
Sub-Saharan Africa	14.1	Extreme weather events	6.4
Total	71.2	Total	71.2

Source: UNEP, 2014⁶

To provide the financial resources required to support both mitigation and adaptation in developing countries, it was reaffirmed by the developed world at the Paris Agreement that they would honour the commitments made in the 2009 Copenhagen Accord to mobilise US\$100 billion annually by 2020. However, estimates suggest that this amount would be inadequate to support the developing world's transition to low-carbon, resilient economies. The costs involved in building the resilience of socio-economic systems to climate change in the developing world alone, is projected to range between US\$140 to 300 billion by 2030, and between US\$280 and 500 billion by 2050.⁵

The gap in adaptation finance requires the mobilisation of new sources of financing from both the public and private sectors. The UNFCCC climate finance meetings held in 2018 highlighted the need for a greater understanding of adaptation finance and exploring potential avenues to 'scale up' said finance.⁷ However, so far, the flow of climate finance to adaptation has remained particularly weak.

The annual '2017 Global Landscape of Climate Finance' report by the Climate Policy Initiative (CPI), in its most comprehensive estimates of international climate finance, assessed that while total global climate finance reached a record high of US\$437 billion in 2015, only 16 percent of it was dedicated to adaptation.⁸ In terms of climate finance flow from developed to developing countries, out of the total US\$86 billion public climate-specific finance flows between 2011-2014, 63 percent targeted mitigation, 16 percent to adaptation, and 21 percent went to crosscutting or other activities.⁹

In terms of the climate finance directed to adaptation in developing countries, the public sector – both bilaterally and multilaterally - has been the major contributor,

with a significant increase in the amount over past years, although estimates vary.^{10 11} Nearly 80 percent (US\$11.8 billion) of the financing for adaptation comes from bilateral climate-related flows, out of which 45 percent is allocated to least developed countries.¹² The global public climate finance flows for adaptation was US\$25 billion in 2013. Of the combined commitment of US\$15.1 billion of international public adaptation finance for developing countries by OECD DAC and Multilateral Development Banks, US\$10 billion is dedicated towards adaptation, while US\$5.1 billion of it is towards activities designed to address both adaptation and mitigation.¹³

Public investments in adaptation are necessary considering some adaptation measures directly concern areas of government activities—public storm shelters, dams, or flood-resistant infrastructure, to name a few. However, for sectors where private activities are affected by climate change—large commercial infrastructure or real estate, for example—financing should increasingly come from commercial or private sources. A growing body of literature¹⁴ highlights private investments in mitigation, but, despite the need, the experience with private sector engagement in adaptation in developing countries has been poor. Private finance accounted for 16 percent of total developed country adaptation finance budgets between 2013–2014, yet, the actual contribution made towards adaptation was only 10 percent.¹⁵ Despite this lack of involvement, it is in the interest of the private sector to engage substantially in adaptation to protect their existing and future investments from the effects of climate change. Climate resilience and adaptation can also provide new, previously unexplored business opportunities.^{16 17}

The reason for businesses to be traditionally more interested in investing in activities that focus on mitigation over adaptation is to secure more immediate, reasonable and predictable returns at acceptable risks.¹⁸ Adaptation projects tend to lack such incentives. Moreover, Developing and Least Developed Countries (LDCs) systematically rank low in the World Bank’s ‘Doing Business’ and the World Economic Forum’s ‘Global Competitiveness Index’—suggesting that these countries, often do not offer enabling environments for secure investments.¹⁹

Paradoxically, Pauw & Pegels argue that the engagement of the private sector in adaptation is “inevitable and potentially significant.”²⁰ First, “private-sector investments constitute 86% of global investment and financial flows²¹ and 90% of the population in developing countries depend on the private sector for their income.”²² Second, as evidence suggests, mobilising private investments in adaptation is imperative considering the high costs of adaptation. There is an established, general agreement that current international public finance flows for resilience are insufficient to meet needs. Unless additional finance from a variety of sources is secured, the gap is likely to broaden over the coming years.²³ Adapting to climate change is also important for the private sector to safeguard business, ensure their continuity and profits, and take advantage of new market opportunities. Yet, a number of barriers currently hinder the private sector’s motivation, ability, and perspective on investing in adaptation action.²⁴

At the same time, it is difficult for developing countries themselves to access

available private finance for adaptation. Different types of financing and funding have different objectives and requirements, thereby making it complicated for the developing countries to navigate the array of sources. These issues include, insufficient awareness of the need for adaptation and the potential sources of funding that is available; difficulty in understanding international investment procedures; lack of capacity to develop and implement projects in partnership with the private sector; and a lack of coherent policies and regulatory frameworks. Moreover, developing countries tend to not have clear sets of priorities when it comes to adaptation and development.²⁵

Challenges for Private Investment in Climate Resilience

The effects of climate change pose risks to the operations, competitiveness and profitability of businesses, both directly and indirectly, as well as the value of tangible and intangible assets. The uncertainties related to future climate change impacts, intangibility of adaptation interventions, long-term payback period, as well as political, institutional and legal bottlenecks have constrained the willingness of private investors to channel funds to resilience projects.

Policy and regulatory barriers

Coherent legal and regulatory frameworks that ensure policy stability and good governance are the enablers of attracting investments from both public and private sectors.²⁶ Deficient domestic market regulations and policy frameworks that are not designed to stimulate adaptation (such as, infrastructure codes and environmental/social impact assessment laws, or lack of economic incentives for investment in climate resilience) can constrain private responses to climate change risks and opportunities.²⁷ While middle-income developing countries have been able, to a certain extent, to attract private finance, low-income developing countries or LIDCs have received its lowest share and continue to rely on Official Development Assistance (ODA) as the main external source of climate finance.²⁸

For enabling an efficient and cost-effective shift to climate-resilient and low-carbon economies, it is imperative to ensure coherence in policy, legal and regulatory frameworks, which is often limited.²⁹ Addressing misalignments between various climate policies such as regulatory regimes for infrastructure that inadvertently deter investment in resilience and poorly designed insurance mechanisms that discourage risk reduction investment, would help in attracting investments in resilience activities.

Lack of knowledge and information

The private sector needs to understand climate vulnerability to integrate climate change risks and opportunities into their investment and decision-making processes. They often face knowledge gaps in availability of investment-relevant data and tools that can inform their decision—lacking the integration of long-term climate trends, as well as the capacity and expertise to identify climate-resilient investment.³⁰ Moreover, the private sector has a tendency to apply short-term

investment horizons, and this impacts their business appetite to invest in climate resilience.

Similarly, developing countries often face challenges in acquiring relevant data on climate and reliable estimates of historical climate phenomena. There are significant uncertainties in the available projections of the magnitude and direction of climate change impacts that are available, as the countries often lack the technical expertise to interpret data and develop climate models. The history of success and failure in achieving expected adaptation and development targets are limited.³¹ This can further inhibit the countries' attempts to access private climate finance.

Lack of awareness

While adaptation activities have found increased relevance in the policy discourses of developing countries at the national level,³² the knowledge of potential options is highly limited among local authorities and non-state actors.³³ There is a lack of knowledge among these actors regarding the availability of finance, the means of access, and whether it meets the needs of the most vulnerable. While impacts from climate change would be borne by the vulnerable communities in each country, no strong adaptation actions at the local level have been formulated to date.³⁴ The information on resilience finance is mostly available across a variety of international databases, making it difficult for local governments and the private sector to obtain. The actors are unable to identify the most relevant sources for their countries³⁵ and the shaping of relative adaptation action.³⁶

Difficulty in accessing finance

Developing countries face the particular challenge of understanding and meeting the complicated procedures and standards that are involved with seeking access to climate finance. Multilateral climate funds are structurally designed to deliver finance through large public sector organisations (such as the National Bank for Agriculture and Rural Development in India) or Non-Banking Financial Companies (NBFCs) as they do not have the mandate or staff to finance transactions directly. Consequently, they have small institutional footprints, affecting their access to these funds. Since multilateral international entities perform project pipeline development, facilitation and management functions, they in turn require strong national institutions that can meet the complex processes and robust fiduciary and environmental standards, to access their funds.³⁷ In order to tap into these financial sources for climate change resilience projects, developing countries need to formulate stronger national climate strategies and in-country institutional structures that can meet the required staffing, expertise, experience and internal controls to be an 'Implementing Entity' (IE) for Adaptation Funds (AF) as well as ensuring the necessary standards and safeguards.³⁸

Capacity constraints

Developing countries lack the technical capacity to design and develop project proposals; this impedes their access to climate finance. Private sector investors

need a robust and achievable rate of return in the project proposals.³⁹ Resilience measures, for the most part, are not revenue-generating and not considered a part of conventional business practice. Since it is difficult to calculate project costs over the long term owing to changing climate, it is difficult to clearly monetise resilience.⁴⁰ While there are support programmes to aid in improving required capacities in developing countries⁴¹ offering complete sets of information, outlining inputs, activities, outputs, outcomes and impacts of a project that aligns with a fund's "logical framework," remains limited.⁴²

Furthermore, a strong monitoring and evaluation mechanism is critical for meeting reporting requirements while accessing international climate finance. However, a key methodological challenge is to gaze the long-term horizons and take uncertainty of climate change into consideration for adaptation measures.⁴³

Motivations for the private sector to engage in resilience

Climate change is likely to increase the risks for businesses by impacting their climate-sensitive assets in social and economic sectors such as, agriculture, water and energy-related infrastructure.⁴⁴ The projected threats of climate change include the disrupting of supply chains, reducing productivity and revenues, and destroying livelihoods – all of which are likely to weaken the creditworthiness of companies,⁴⁵ thereby also increasing the financial risks for financial institutions.⁴⁶ The private sector must therefore engage substantially in building resilience to avoid such risks and respond to new market conditions.⁴⁷ Moreover, the private sector has the potential to make significant contributions to enhance adaptation by developing new climate-resilient products, technologies and services and accelerate the replication of climate-resilient approaches.

Scholars have categorised private sector motivation for engagement in adaptation under 'climate risk management' and 'new markets and business opportunities.' Climate risk management can be defined as "mainstreaming adaptation in business practice to protect revenues and to prevent future costs from changing climatic conditions."⁴⁸ The apprehended risks could be from either direct sources, such as a business's local exposure to climate impacts (including heat stress, water scarcity, and extreme weather events) that cause damage to physical assets, production and health. They could also be from indirect risks, including the broader effects of climate impacts, such as disruption of infrastructure or supply chains and impacts on communities or workforce. However, financing climate risk management projects remains a challenge. While 83 percent of respondents in the 'Caring for Climate' survey recognise the risk from climate change impacts to their products or services, identifying additional costs of rising insurance policies, disruption of supply chains, or regulatory risk as adaptation becomes particularly difficult.⁴⁹

On the other hand, new markets and business opportunities could arise due to changing demands in sectors such as agriculture, communication, technology and information services, and water management. They could also come from publicly funded adaptation projects that require implementation by specialised private-sector companies that mainstream climate risks during large infrastructure project

Business drivers for adaptation and disaster resilience action

Opportunity type	Benefits	Examples
Development and distribution of new products and services	• New revenue streams • Gain competitive advantage • Diversify risk portfolio.	Swiss Re (and partners): The Horn of Africa Risk Transfer for Adaptation (HARITA) and R4 Rural Resilience Initiative allow cash-poor farmers to work for their insurance premiums by engaging in community-identified projects to build climate resilience. The potential to expand beyond Ethiopia to open up new SSA markets for insurers is high.
New, expanded markets for products and services	• New revenue streams. • Increased market share. • Long-term viability	Safaricom/GE: A partnership in Kenya, which supports the expansion of low carbon telecoms infrastructure into rural areas in the north. Solar powered mobile station base units resilient to power cuts, allow continued communication for the community, including the provision of drought and weather information to support rural small holders. A real triple win for development, resilience and climate change mitigation.
Cost savings	• Reduced raw material and operational costs. • Protects profitability when margins are tight. • Improved insurance purchasing and lower residual losses.	Sun International Hotels: The Zambian hotel chain has developed a local food sourcing programme supporting 400 smallholder farmers. This has ensured their security of supply and reduced costs for their hotels, alongside providing livelihood opportunities to smallholders in the region.
Collaboration through supply chain	• Competitive advantage gained through a more secure and resilient supply chain. • Security of supply protects revenue streams.	A global agribusiness consulted as part of this study: This global producer of tea and cut flowers works with its supplier farmers to help build awareness on climate change issues as well as facilitating a multi-stakeholder approach to build resilience, for example through better catchment management.
Reputation and brand value	• Market leadership. • Increased investor, consumer and other stakeholders' confidence.	Siemens: Development of a low-cost, simple, portable water purification system that does not require electric power or purification chemicals, which can be distributed to vulnerable communities post-disaster. This, along with other innovations, has secured their reputation as a leader in technologies to address climate change and resilience challenges.

Source: DFID, 2013⁵¹

design and implementation—climate-resilient roads and flood protection barriers, for example.⁵⁰

Where does the opportunity lie in India?

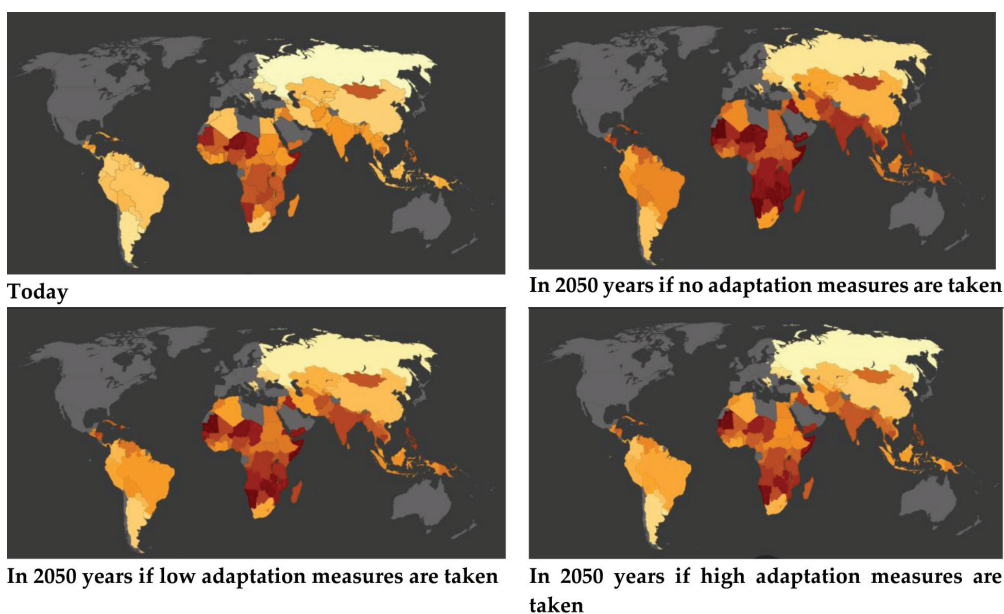
The impacts of climate change and vulnerabilities in key sectors such as agriculture, infrastructure, energy and health continue to be poorly understood, given both the inherent uncertainty of climate data and the complexity of the systems that will be impacted. The capacity to anticipate future impacts and investment needs in these sectors under conditions of uncertainty, complexity and ambiguity would require fundamentally different research and policy approaches.

Agriculture

Climate change will largely have a negative impact on crop production, although some exception could be made in certain high- altitude regions where rising temperatures could positively affect agriculture production and yields. Proceedings of the National Academy of Sciences 2017⁵² suggest that increased temperatures from climate change are expected to reduce yields of the four crops humans depend on most—wheat, rice, corn and soybeans — by 6 percent, 3.2 percent, 7.4 percent, and 3.1 percent, respectively.⁵³ Moreover, climate change-induced extreme events such as droughts, floods, and storms destroy, among other things, crops and agro-infrastructure.

The estimated rise in temperature by 1-3°C by 2050 and resultant extreme precipitation are likely to intensify stress, causing soil erosion and significant loss of topsoil.⁵⁴ Besides the decline in agriculture production and yield, climate change impacts are also likely to slow the growth and life-cycle of livestock. The global demand for food is expected to increase anywhere between 59 percent to 98 percent by 2050.⁵⁵ This is likely to cause additional pressures on farmers and put

Figure: Food Insecurity and Climate Change Vulnerability Map



Source: World Bank compilation from UK Met Office, *Food Insecurities and Climate Change Data*⁵⁸

them at risk of financial destitution. A rise in temperature over a long period of time would lead to melting of glaciers and the raising of sea levels, which would affect water supply and the livelihood of coastal societies and low lands. The collective impacts would exacerbate the risks of hunger and undernutrition.⁵⁶

The Food Insecurity and Climate Change Vulnerability map by the UN World Food Programme (WFP) and the Met Office Hadley Centre, illustrates the hunger and vulnerability to food insecurity scenarios under different levels of adaptation efforts.⁵⁷

Despite this, there is a growing commercial potential for agri-resilience investments. One of the key and growing agri-resilience sub sectors where there is scope for private and public sector investment is water infrastructure. Another key area where the private sector can invest and largely contribute to is the agri value chain. The small sub-sectors under the value chain requires training farmers and providing them with technical assistance, to ensure better access to finance and knowledge. Private sector investment in farmer advisories would also contribute to sustainability of agri-resilience investment for small and medium enterprises in developing economies.⁵⁹ Another area where private capital flows can be diverted include investments in climate smart agriculture, which is the type of high-value add, non-traditional agricultural asset that investors tend to be attracted to.⁶⁰ Additionally, successful models pioneered by agricultural banks such as NABARD⁶¹ and micro-financing initiatives such as Kiva⁶² have shown that private capital can be directed to loans and investments for small farm-holds as well.

Energy

Energy systems are largely viewed as mitigation projects as they are major emitters and thereby significant contributors to climate change. Indeed, energy production, particularly from fossil thermal energy such as coal, oil, gas that are primary production sources for developing countries, contribute to 25 percent of global greenhouse gas (GHG) emissions.⁶³ However, energy systems are equally vulnerable to the climate change impacts. For instance, thermal power plants need cool water as hotter-than-normal water intakes in plants makes them less effective. Extreme weather can prevent coal and petroleum supply delivery, thereby disrupting both fossil-fuel inputs. This is also true in the case of renewable energy systems.⁶⁴ Variability in the degree of rainfall reduces the power generating ability of hydropower plants that are usually dependent on regular rainfall. At the same time, extreme precipitation can also affect solar photovoltaic (PV) systems, and intense storms can damage wind turbines. Moreover, weather events along with high temperatures can damage power transmission systems, impacting electricity output and shutting down the power grid, forcing business owners and others to rely on diesel generators that are expensive and inefficient.⁶⁵

The United Nations General Assembly 2016 estimates that 1.1 billion people lack access to reliable source of power.⁶⁶ A projected increase in population, with the majority of growth expected in the developing countries of Asia and Africa, means there will be an increase in demand for energy. Moreover, energy need is often

highest at daytime due to heating and cooling requirements, as well as industrial demands. Peak demand produces additional stress on energy grids, providing another factor that increases the risk of system failure.⁶⁷

Despite this, private-sector investments in advanced technologies for distributed power generation, smart grids, energy-efficient buildings and alternative energy for transport could contribute to improved efficiency and availability. Additionally, if emerging and developing nations embrace the privatisation of transmission and distribution networks, the resilience of power transmission systems can be drastically improved – either through regulation demanding the upgrade of the systems by governments during the sale process or through the foresight of the acquiring firms. In certain countries, the acquisitions will come from large conglomerates, but other countries might not have such domestic alternatives and will therefore have to attract private equity firms and institutional investors through policy and regulatory changes.

Health

By 2030, climate change is projected to have irreversible negative impacts on health that could largely undo global poverty reduction strategies, thereby pushing more than 100 million people back to extreme poverty.⁶⁸ Climate change will exacerbate cardiovascular diseases and respiratory illnesses, linked to air pollution.⁶⁹ Higher frequency of extreme weather events, rising sea levels, rising temperatures, and changing patterns of precipitation are all linked to negative health outcomes.

It is expected that climate change will increase health risks associated with extreme weather events that are more frequent, intense, of longer duration and with greater spatial extent. Increased UV radiation, air pollution, contamination, and re-emergence of rodent and vector-borne infectious diseases would increase health challenges faced by vulnerable populations, especially across the developing world.⁷⁰

In addition to these direct effects to the health of people, increased extreme weather events would damage hospital buildings, cause power or water outages and disrupt delivery of health care at the frontlines.⁷¹ Road blocks may limit the accessibility of supplies and essential services needed for running health facilities, such as energy and water supply and obstruct patients' accessibility to health facilities.⁷² There is a huge need for private-sector investment in making healthcare facilities and systems climate resilient.

However, the burden of upgrading healthcare facilities and systems, does not have to be fully borne by the private entities or governments that own them. Using blended financing instruments that are available through multilateral development banks can allow both the public and private sector to access bank debt at significantly lower interest rates, thereby lowering the total cost of upgrading the facilities. Additionally, the holding companies of the healthcare systems can issue bonds that are specifically earmarked toward making the facilities climate resilient. These bond issuances will, in all probability, generate significant interest

from socially responsible investors – from institutional investors all the way down to day traders.

Transport

Like energy systems, transport is considered a key sector in the mitigation of climate change. Worldwide, transportation consumes 64 percent of global oil and 27 percent of energy and contributes to one-quarter of total GHG emissions.⁷³ Transport is also a vital driver of a well-functioning economy. By enabling people-to-people connectivity, access to essential services such as healthcare and jobs, the transportation sector allows the flow of goods and services, knowledge transfer, competition and opportunities, thereby fostering long-term growth.⁷⁴

This sector, like many others is just as vulnerable to climate change stressors. Extreme events such as heat waves can damage transport infrastructure by making roads and rail unstable. Heavy rainfall, floods and landslides can wash away roads and rail connections. Storm surges may damage ports and block water channels. These could cause severe disruptions and block access for long periods of time, thereby isolating communities, impacting markets and economies.⁷⁵

Transport systems are generally designed based on historical local conditions that do not predict future risk of delays, disruptions and damage. There is a need for well-conceived sustainable transport infrastructure that is resilient to climate and natural hazards.⁷⁶ This requires investment in large scale. In low-income countries, an estimated population of one billion still lacks access to all-weather roads.⁷⁷ High mobility costs impacts the poor, who often lack reliable and affordable public transportation. Asia alone requires US\$40 trillion for infrastructure development, including transport, before 2030.⁷⁸ Opportunities for building climate resilience are greatest when integrated into the initial design and construction of new infrastructure rather than retrofitting. The sector undoubtedly provides various market opportunities for investing in its resilience.

Conclusion

A critical challenge for private-sector participation in projects that build the resilience of communities, businesses and the economy is the lack of knowledge and awareness of both the needs and opportunities for climate action. Here the research and knowledge community have a critical role to play, not only to provide research-based knowledge on likely climate risks to businesses, the infrastructure and economies they depend on, but also to change mindsets, build capacities and break the silos within which the research and practice communities working on climate adaptation and finance work operate. The adaptation research community is often focused on grassroots research, examining how households and communities (particularly those that are especially vulnerable due to their social conditions) are likely to be impacted by changing climate. Many of the challenges and actions this research identifies are typically considered to be the domain of the public sector. Within the finance community, environment concerns have typically been seen as a 'cost' to businesses - cause for delays in approvals of projects or draw down on

profits and reduction in rates of return. Neither of these positions are defensible as climate impacts become ubiquitous and impact all aspects of economies, and indeed life. More interdisciplinary research and dialogue across the epistemic communities is needed to engage and draw private capital into building resilience of economies and countries to climate impacts.

Endnotes

- 1 Change, Climate. "Impacts, vulnerabilities and adaptation in developing countries." *Climate Change Secretariat (UNFCCC)* (2007).
- 2 Rogelj, Joeri, Michel Den Elzen, Niklas Höhne, Taryn Fransen, Hanna Fekete, Harald Winkler, Roberto Schaeffer, Fu Sha, Keywan Riahi, and Malte Meinshausen. "Paris Agreement climate proposals need a boost to keep warming well below 2 C." *Nature* 534, no. 7609 (2016): 631.
- 3 Divya Sharma and Sanjay Tomar. "Mainstreaming climate change adaptation in Indian cities." *Environment and Urbanization* 22, no. 2, 2010, 451-465.
- 4 UNEP 2014. *The Adaptation Gap Report 2014*. United Nations Environment Programme (UNEP), Nairobi
- 5 UNEP 2016. *The Adaptation Finance Gap Report 2016*. United Nations Environment Programme (UNEP), Nairobi
- 6 UNEP 2014. *The Adaptation Gap Report 2014*. United Nations Environment Programme (UNEP), Nairobi
- 7 UNFCCC, 2018. *Standing Committee on Finance. Biennial Assessment and Overview of Climate Finance Flows Technical Report*
- 8 Barbara Buchner, Padraig Oliver, Xueying Wang, Cameron Carswell, Chavi Meattle and Federico Mazza. "Global Landscape of Climate Finance 2017." *Climate Policy Initiative* (2017).
- 9 UNEP 2016. *The Adaptation Finance Gap Report 2016*. United Nations Environment Programme (UNEP), Nairobi
- 10 OECD DAC Statistics *Aid to Climate Change Adaptation*, 2014
- 11 Peterson Carvalho, Annaka, and Pieter Terpstra. "Tracking adaptation finance: an approach for civil society organizations to improve accountability for climate change adaptation." 2015
- 12 OECD DAC. "Climate-related development finance in 2013." 2015
- 13 OECD. "Toolkit to Enhance Adaptation Finance. For developing countries that are vulnerable to adverse effects of climate change, including LIDCs, SIDS and African states." Report to the G20 Climate Finance Study Group prepared by the Organisation for Economic Co-operation and Development (OECD) in collaboration with the Global Environment Facility (GEF). 2015
- 14 Briner, G., T. Kato, S. Konrad, and C. Hood, "Taking Stock of the UNFCCC Process and its Interlinkages", OECD/IEA Climate Change Expert Group Papers, No. 2014/04, OECD Publishing, Paris
- 15 OECD DAC. "Climate-related development finance in 2013." 2015
- 16 ATKearney. "Adapting to the inevitable. A.T.Kearney's foresight series, Thinkforward. 2013
- 17 PwC. *Business leadership on climate change adaptation. Encouraging engagement and action*. 2010 London: Author
- 18 Pauw, W. P. "Not a panacea: private-sector engagement in adaptation and adaptation finance in developing countries." *Climate Policy* 15, no. 5, 2015: 583-603.
- 19 *ibid*
- 20 Pauw, Pieter, and Anna Pegels. "Private sector engagement in climate change adaptation in least developed countries: an exploration." *Climate and Development* 5, no. 4 (2013): 257-267.
- 21 UNFCCC, Investment. "Investment and financial flows to address climate change." Bonn: UNFCCC (2007).
- 22 Pauw, W. P. "Not a panacea: private-sector engagement in adaptation and adaptation finance in developing countries." *Climate Policy* 15, no. 5, 2015: 583-603
- 23 CICERO & CPI. "Background Report on Long-term Climate Finance. Prepared for the German G7 Presidency." 2015. CICERO and Climate Policy Initiative

- 24 Agrawala, Shardul, Maëlis Carraro, Nicholas Kingsmill, Elisa Lanzi, Michael Mullan, and Guillaume Prudent-Richard. "Private sector engagement in adaptation to climate change: approaches to managing climate risks." 2011.
- 25 OECD. "Toolkit to Enhance Adaptation Finance. For developing countries that are vulnerable to adverse effects of climate change, including LDCs, SIDS and African states." Report to the G20 Climate Finance Study Group prepared by the Organisation for Economic Co-operation and Development (OECD) in collaboration with the Global Environment Facility (GEF). 2015
- 26 Mathur, Vikrom, and Aparajit Pandey, "Great Walls: Addressing Domestic Barriers to Climate Action Projects in India", Observer Research Foundation, 2017
- 27 Trabacchi, C and F Mazza. "Emerging solutions to drive private investment in climate resilience. A Climate Policy Initiative Working Paper. 2015
- 28 OECD. "Toolkit to Enhance Adaptation Finance. For developing countries that are vulnerable to adverse effects of climate change, including LDCs, SIDS and African states." Report to the G20 Climate Finance Study Group prepared by the Organisation for Economic Co-operation and Development (OECD) in collaboration with the Global Environment Facility (GEF). 2015
- 29 OECD 2015, Aligning Policies for a Low-carbon Economy, OECD Publishing, Paris
- 30 Peterson Carvalho, Annaka, and Pieter Terpstra. "Tracking adaptation finance: an approach for civil society organizations to improve accountability for climate change adaptation." 2015.
- 31 OECD 2014, Climate Resilience in Development Planning: Experiences in Colombia and Ethiopia, OECD Publishing, Paris
- 32 UNFCCC 2015, "Report on the 27th meeting of the Least Developed Countries Expert Group", FCCC/SBI/2015/7, The United Nations Framework Convention on Climate Change, Bonn.
- 33 Wilkinson, E., et al. 2014. "Going in the right direction? Tracking adaptation finance at the subnational level", ODI Working Papers, Overseas Development Institute, London
- 34 ibid
- 35 Peterson Carvalho, Annaka, and Pieter Terpstra. "Tracking adaptation finance: an approach for civil society organizations to improve accountability for climate change adaptation." 2015.
- 36 Wilkinson, E., et al. 2014. "Going in the right direction? Tracking adaptation finance at the subnational level", ODI Working Papers, Overseas Development Institute, London
- 37 Briner, G., T. Kato, S. Konrad, and C. Hood, "Taking Stock of the UNFCCC Process and its Interlinkages", OECD/IEA Climate Change Expert Group Papers, No. 2014/04, OECD Publishing, Paris
- 38 GEF 2014, Programming Strategy on Adaptation to Climate Change - Least Developed Countries Fund Special Climate Change Fund, the Global Environment Facility, Washington D.C
- 39 Vandeweerd, Veerle, Y. Glemarec, and S. Billett. "Readiness for Climate Finance: A framework for understanding what it means to be ready to use climate finance." New York: United Nations Development Programme 2012.
- 40 Briner, G., T. Kato, S. Konrad, and C. Hood, "Taking Stock of the UNFCCC Process and its Interlinkages", OECD/IEA Climate Change Expert Group Papers, No. 2014/04, OECD Publishing, Paris
- 41 UNFCCC 2014, "Information paper on experiences, good practices, lessons learned, gaps and needs in the process to formulate and implement national adaptation plans", FCCC/SBI/2014/INF.14, The United Nations Framework Convention on Climate Change, Bonn
- 42 Christiansen, L., et al. 1999 "Accessing International Funding for Climate Change Adaptation – A Guidebook for Developing Countries." UNEP Risø Centre on Energy, Climate and Sustainable Development, Roskilde, Denmark
- 43 OECD 2015. National Climate Change Adaptation: Emerging Practices in Monitoring and Evaluation, OECD Publishing, Paris
- 44 IPCC 2014. "Summary for policymakers" in Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects, Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., et al. (eds.)], Cambridge University Press, Cambridge (the United Kingdom) and New York, pp. 1-32.
- 45 Crawford, Meg, and Stephen Seidel. "Weathering the storm: Building business resilience to climate change." Centre for Climate and Energy Solutions (2013): 112.
- 46 IFC (2012), Enabling Environment for Private Sector Adaptation, the International Finance Corporation (IFC), Washington D.C.
- 47 Pauw, W. P., Richard JT Klein, P. Vellinga, and F. Biermann. "Private finance for adaptation: do private realities meet public ambitions?." Climatic Change 134, no. 4 (2016): 489-503.
- 48 Pauw, W. P. "Not a panacea: private-sector engagement in adaptation and adaptation finance in developing countries." Climate Policy 15, no. 5 (2015): 583-603.

- 49 UN Global Compact, UNEP, Oxfam & WRI. (2011). Adapting for a green economy: Companies, communities and climate change (A caring for climate report). New York, NY: UN Global Impact.
- 50 Intellectap. (2010). Opportunities for private sector engagement in urban climate change resilience building. Hyderabad: Intellectap.
- 51 Department for International Development, *Simulating Private Sector Engagement and Investment in Building Disaster Resilience and Climate Change Adaptation*, December 2013
- 52 Zhao, Chuang, Bing Liu, Shilong Piao, Xuhui Wang, David B. Lobell, Yao Huang, Mengtian Huang et al. "Temperature increase reduces global yields of major crops in four independent estimates." *Proceedings of the National Academy of Sciences* 114, no. 35 (2017): 9326-9331.
- 53 Jeff McMahon, "Climate Change Already Impacting Wheat, Rice, Corn, Soybean Yields Worldwide," *Forbes*, September 1, 2017 available at: <https://www.forbes.com/sites/jeffmcmahon/2017/09/01/climate-change-already-impacting-wheat-rice-corn-soybean-yields-worldwide/#491978a3777b>
- 54 U.S. Global Change Research Program "National Climate Assessment: Agriculture" available at: <http://nca2014.globalchange.gov/report/sectors/agriculture>
- 55 Valin, Hugo, Ronald D. Sands, Dominique van der Mensbrugghe, Gerald C. Nelson, Helal Ahammad, Elodie Blanc, Benjamin Bodirsky et al. "The future of food demand: understanding differences in global economic models." *Agricultural Economics* 45, no. 1 (2014): 51-67.
- 56 Ibid
- 57 UK Met Office Hadley Centre and World Food Programme, Data on Food Insecurity and Climate Change. Available at: <https://www.metoffice.gov.uk/food-insecurity-index/>
- 58 Tordo, Silvana, Gianni Lorenzato, Jing Zhao, Kyle McEneaney, and Sebastian Phillip Sarmiento-Saher. "Options for Increased Private Sector Participation in Resilience Investment: Focus on Agriculture." (2017).
- 59 Ibid
- 60 Branca, Giacomo, Timm Tennigkeit, Wendy Mann, and Leslie Lipper. Identifying opportunities for climate-smart agriculture investment in Africa. Rome, Italy: Food and Agriculture Organization of the United Nations, 2012.
- 61 Vinson Kurien, 'Nabard's growth has few parallels among peers,' *Hindu Business Line*, published July 17, available at: <https://www.thehindubusinessline.com/money-and-banking/Nabard%E2%80%99s-growth-has-few-parallels-among-peers/article20821047.ece>
- 62 Kiva, available at: <https://www.kiva.org/about>
- 63 United States Environmental Protection Agency, Global Greenhouse Gas Emissions Data Available at: <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>
- 64 U.S. Global Change Research Program "Energy Supply and Use Report." Available at: <https://nca2014.globalchange.gov/report/sectors/energy>
- 65 U.S. Environmental Protection Agency (EPA), "Understanding the Link Between Climate Change and Extreme Weather" Obama Administration Archive 2017, Available at: https://19january2017snapshot.epa.gov/climate-change-science/understanding-link-between-climatechange-and-extreme-weather_.html
- 66 International Energy Agency, Energy Access Database Available at: <https://www.iea.org/energyaccess/database/>
- 67 Ibid
- 68 The World Bank, Climate Change Overview. Available at: <https://www.worldbank.org/en/topic/climatechange/overview>
- 69 D'Amato, Gennaro, Lorenzo Cecchi, Mariella D'Amato, and Isabella Annesi-Maesano. "Climate change and respiratory diseases." (2014): 161-169.
- 70 Wu, Xiaoxu, Yongmei Lu, Sen Zhou, Lifan Chen, and Bing Xu. "Impact of climate change on human infectious diseases: Empirical evidence and human adaptation." *Environment international* 86 (2016): 14-23.
- 71 The Canadian Coalition for Green Health Care and the Nova Scotia Department of Environment and Health Canada, "Health Care Facility Climate Change Resiliency Toolkit," 2016. Available at: <http://www.greenhealthcare.ca/climateresilienthealthcare/CCGHC-HealthCareFacilityResiliencyChecklist.pdf>
- 72 World Health Organisation. "Risk reduction and emergency preparedness. WHO six-year strategy for the health sector and community capacity development" 2007. Available at: https://www.who.int/hac/techguidance/preparedness/emergency_preparedness_eng.pdf
- 73 Tordo, Silvana, Gianni Lorenzato, Jing Zhao, Kyle McEneaney, and Sebastian Phillip Sarmiento-Saher. "Options for Increased Private Sector Participation in Resilience Investment: Focus on Agriculture." (2017).
- 74 The Economic Times, 'Why transport infrastructure is most important for country's progress,' February 2016. Available at: <https://economictimes.indiatimes.com/why-transport-infrastructure-is-most-important-for-countrys-progress/articleshow/50865730.cms>

- 75 Michael Meyer et al., "Climate Change, Extreme Weather Events and the Highway System: A Practitioner's Guide," National Cooperative Highway Research Program. Available at: http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-83%2805%29_AdaptationGuidanceDoc.pdf
- 76 Pregolato, Maria, Alistair Ford, Sean M. Wilkinson, and Richard J. Dawson. "The impact of flooding on road transport: A depth-disruption function." *Transportation research part D: transport and environment* 55 (2017): 67-81.
- 77 The World Bank, Transport Overview. Available at: <https://www.worldbank.org/en/topic/transport/overview>
- 78 Asian Infrastructure Investment Bank, Annual Meeting of the Board of Governors, Summary of Proceedings. 2018. Available at: https://www.aiib.org/en/about-aiib/governance/board-governors/.content/index/_download/proceedings-board-of-governors-June-2018.pdf

Rating Resilience: Factoring Climate Resilience into Infrastructure Risk Metrics

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Background

Climate change is already affecting the weather, ecosystem services and the well-being of humans and the environment around the world. The number of extreme weather events and changes to climate events are now increasing at faster rates, which is further projected to only increase with time. Adapting to this new future climate and building a resilient infrastructure is vital in sustaining our existence (Smith et al., 2001). Previous studies suggest that the level of investment needed to adapt to climate change and build resilience could be anywhere between US\$25 and US\$100 billion over the next 20 years, based on a median climate change scenario (Fankhauser, 2009). Disaster Risk Management (DRM) has received significant attention in recent years, not least through the Sendai Framework (Aitsi-Selmi et al., 2015). At the same time, the number of legal and political mandates for incorporating climate change information into decision-making is now drawing more attention.

The IPCC defines “adaptation” as the “adjustment in natural or human systems in response to actual or expected climate stimuli and their effects, which moderates harm or exploits beneficial opportunities.” (IPCC, 2007). Conversely, “maladaptation” is commonly defined as a situation that may arise in situations when actions “lead to increased risk of climate-related outcomes, increased vulnerability to climate change, or diminished welfare now or in the future.” (IPCC, 2014). Enterprises engaging in adaptation should consider and evaluate the consequences of their actions, both deliberate and inadvertent. It is also necessary to regularly review

these actions as scientific knowledge improves, to ensure that adaptation efforts do not unduly compromise or undermine desired objectives or result in unwanted consequences.

In recent years, there has been a significant surge in the amount of finance available for supporting adaptation, for example, the Green Climate Fund, multi- and bilateral donors, and renewed interest from national governments (Preston et al., 2011; Termeer et al., 2012). As the level of funding has increased to satisfy the need for adaptation so has the need for comprehensive method syntheses and adaptation guidance to (i) ensure adaptation is taking place at the right time, at the right place and at the right rate; (ii) diagnose and ensure areas of high risk or significant vulnerability are sufficiently addressed; (iii) enable the effective comparison of adaptation projects in space and time; (iv) ensure resources and support for adaptation is being effectively utilised and resulting in tangible action; and (v) inform current gaps and deficiencies in research, practice and policy, including governance structures (Pielke et al., 2007; Berrang-Ford et al., 2011; Biesbroek et al., 2013).

The use of metrics to inform the management of climate change related investments is ever increasing. While occasionally, these are driven by individual firms, most often, they form part of a wider, community-level approach. For example, several groups have been set up to facilitate access to data and metrics, including the Global Reporting Initiative (GRI), the Asset Owners Disclosure Project (AODP) and the Carbon Disclosure Project (CDP). Such voluntary initiatives allow investors to collaborate and form coalitions, which have much more impact than individual organisations do. The CDP represents investments of over US\$100 trillion. However, there is little evidence that these initiatives have driven real change in either investments or policy (Kolk, Levy & Pinske, 2008), although there is some evidence that there is a learning effect within firms that take part in these reporting initiatives (Matisoff, Noonan & O'Brien, 2013). Historically, such initiatives have focused on reporting climate change mitigation efforts, not resilience and adaptation.

With regards to mitigation, an important policy request from investors has been for a price to be put on carbon (IIGCC, 2011). So far, there has been no real move towards a global carbon price, although various regions have adopted policies to create local markets for carbon. In the absence of a global carbon price, the private sector has expressed some reluctance in significantly increasing investments due to a perception of increased risk (Jones, 2015). To counter some of this perception, the public sector is creating public-private partnerships (PPPs) and opportunities for blended finance (Vivid Economics, 2014). Investing alongside the public sector will lower the risk and increase market opportunities. However, most such PPPs focus on institutional investors, while the largest portion of current investments come from corporates and project developers (Vivid Economics, 2014). PPPs are often used to explore the development of metrics.

The challenge of transforming the investment landscape from a fossil-fuel economy to a low-carbon one has led many to explore the path-dependent nature of those investments (Lovio et al., 2011). There must be a significant and active process

of driving the required change in investment landscape, to move away from this “carbon lock in.” (Kemp-Benedict, 2014). However, in the absence of such a drive away from the high-carbon pathway at the scale required, there is an increased perception of material financial risk resulting from climate change (Jones et al., 2013).

Of all asset owners globally, 60 percent—representing US\$27 trillion in investment—now incorporate some level of climate risk in their decision-making processes (Asset Owners Disclosure Project, 2017). This represents a significant change between 2016 and 2017 with 45 asset owners adding climate-risk considerations. However, as noted above, the level of investment into mitigation does not match the perceived risk. Within US asset owners, only 0.5 percent of investment is channelled towards low-carbon assets (Asset Owners Disclosure Project, 2017).

Current Practice in Measuring Resilience

There are several methods used to categorise resilience practice. These include classifications such as research, plan, networks, legislation, awareness raising, implemented change, training and advocacy (Agrawal & Perrin, 2009) or migration, storage, diversification, pooling and market exchange (Tompkins et al., 2010). Standardised quantified measures for categorising resilience are being proposed by a variety of public and private bodies. These quantified measures are still in their early stages of development.

For example, the Green Climate Fund (2014) has proposed the following quantified measures for adaptation:

- Environmental effectiveness: including units of human health (disability-adjusted life years (DALYs)) and units of wealth (US\$) saved and enhanced
- Cost-effectiveness: US\$/DALY and US\$ saved
- Co-benefits: US\$/unit of co-benefit
- Institutional feasibility: level of acceptance

Currently, there are limited examples of these metrics in use. Reporting often refers to whether particular projects form part of the National Adaptation Programmes of Action (NAPAs) under the United Nations Framework Convention on Climate Change (UNFCCC). The submitted NAPA documents from each country require some indication of Monitoring and Evaluation (M&E) of adaptation measures, including qualitative and quantitative measures. However, there is currently no consistent approach to M&E.

The UK’s Private Infrastructure Development Group (PIDG, 2012) measures adaptation against three classifications:

- Tier 1: Projects in which the principal objective is to facilitate adaptation to climate change and climate vulnerability;
- Tier 2: Projects in which adaptation is a secondary objective and/or is likely to lead to significant climate-change co-benefits;

- Tier 3: Projects that are not designed to facilitate adaptation to climate change or whose impact is not likely to be significant.

Within PIDG's current definition, two aspects of adaptation are covered but not explicitly differentiated. These are (i) project resilience and (ii) community adaptation. It is, however, important to distinguish between infrastructure that is itself resilient to climate change (for example, a building adapted to withstand expected heat waves) and infrastructure that enhances the resilience of the community (for example, flood defences). Any metric used should be able to identify building-adaptive capacity as different from building-adaptation infrastructure. The above measures are aimed at adaptation projects, not the resilience of infrastructure aimed at providing wider adaptation benefits.

As part of their tool to evaluate projects that issue Green Bonds, Standard & Poor's (S&P, 2016) propose a quantified measure of adaptation or resilience. This measure is the ratio of expected adaptation benefit to investment. The adaptation or resilience benefit is the reduction in combined expected financial, humanitarian and ecological damage (all monetised) over some future climate scenario. S&P also incorporated their "view of the adequacy of the third-party data and assumptions used to determine the resilience benefit," (S&P, 2016) although they do not detail how this would be measured or combined with the ratio measure.

Moody's (2017) uses an analytical framework to measure the resilience of different industrial and economic sectors in their environmental, social and governmental approach to credit analysis. Within this framework, Moody's quantifies the level of exposure and resilience separately. The exposure and resilience measures for each sector is different, and therefore, the framework is defined separately for each type of asset. For example, the resilience to climate change of sovereign debt is quantified by using measures of the levels of development, government responsiveness and fiscal flexibility. The exposure to climate risk of sovereign debt is then quantified through diversification of the economy and geographic exposure to weather.

The Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD) considers the physical, liability and transition risks associated with climate change and what constitutes effective financial disclosures across industries. Up to US\$43 trillion in global assets are at risk from climate change between 2017 and the end of the century (TCFD, 2017). They identified the following risks that should be accounted for within any metric of resilience (TCFD, 2017):

Policy and Legal

- Increased pricing of GHG emissions
- Enhanced emissions
- Mandates on and regulation of existing products services
- Exposure to litigation

Technology

- Substitution of existing products and services with lower-emission options
- Unsuccessful investment in new technologies
- The cost of transitioning to low-emissions economy

Markets

- Changing customer behaviour
- Uncertainty in market signals
- Increased cost of raw materials

Reputation

- Shifts in consumer preferences
- Stigmatisation of sector
- Increased stakeholder concern or negative feedback

Acute Physical Risks

- Increased severity of extreme weather events, such as cyclones and floods

Chronic Physical Risks

- Changes in precipitation patterns and extreme variability weather patterns
- Rising mean temperatures
- Rising sea levels

Conversely, the Task Force highlighted the following benefits of investing in resilience (TCFD, 2017):

- Increased market valuation through resilience planning (e.g. infrastructure, land and buildings)
- Increased reliability of supply chain and ability to operate under various conditions
- Increased revenue through new products and services related to ensuring resilience

The Green Bond Assessments, while not credit ratings, apply to bond issues (Moody's, 2016). They use a similar tiered system (See Table 1) to PIDG and use a weighted scorecard that measures five factors, including (weights in brackets):

- Organisation (15 percent)
- Use of Proceeds (40 percent)
- Disclosure on the Use of Proceeds (10 percent)
- Management of Proceeds (15 percent)
- Ongoing Reporting and Disclosure (20 percent)

Towards a Framework for Metrics of Resilience

Socioeconomic and environmental uncertainties have the potential to significantly undermine the desired outcomes of infrastructure investments, particularly in the case of assets that are long-lived or highly dependent on other services/infrastructures, which in turn are climate sensitive and/or easily compromised.

If a particular asset is a) designed with community adaptation in mind or b) particularly vulnerable to climate change, further evaluation of additional quantitative and qualitative performance metrics may be needed to ensure that the asset delivers on its desired outcomes related to adaptation. These metrics can be used to objectively compare as well as individually evaluate the robustness and resilience of current projects and investments, recognising the significant uncertainties underpinning the future evolution of current socioeconomic systems—e.g. demographic changes or development trajectories—and the future climate in which they will likely operate. Even where exposure information (physical climate risk) is available and has been used, there is a clear need to develop the modelling capability to get better and more reproducible results, e.g. the two main current climate exposure models used by industry-predicted non-overlapping exposures (the predicted range of impact of one model was completely different from the range of impact of the other model) following Hurricane Maria.

Ideally, any final quantified metric should be reported as an annual net-benefit each year, for the full lifetime of all investments. Using these figures, it should then

Table 1: Assessment Classification System for Green Bonds (Moody's, 2016)

GB1	Excellent	Green bond issuer has adopted an excellent approach to manage, administer, allocate proceeds to and report on environmental projects financed with proceeds derived from green bond offerings. Prospects for achieving stated environmental objectives are excellent.
GB2	Very Good	Green bond issuer has adopted a very good approach to manage, administer, allocate proceeds to and report on environmental projects financed with proceeds derived from green bond offerings. Prospects for achieving stated environmental objectives are very good.
GB3	Good	Green bond issuer has adopted a good approach to manage, administer, allocate proceeds to and report on environmental projects financed with proceeds derived from green bond offerings. Prospects for achieving stated environmental objectives are good.
GB4	Fair	Green bond issuer has adopted a fair approach to manage, administer, allocate proceeds to and report on environmental projects financed with proceeds derived from green bond offerings. Prospects for achieving stated environmental objectives are fair.
GB5	Poor	Green bond issuer has adopted a poor approach to manage, administer, allocate proceeds to and report on environmental projects financed with proceeds derived from green bond offerings. Prospects for achieving stated environmental objectives are poor.

be possible to calculate the Net-Present Value or NPV (HM Treasury, 2003, Ranger et al., 2010) using a level of discounting as appropriate for the particular asset type. In addition, complementary metrics such as the Internal Rate of Return (IRR) and asset repayment period, and other non-monetary valuation metrics should be used as required.

Discount rates are calculated differently, depending on the field of study, sector and even the analyst performing the evaluation. For example, the private sector tends to treat the discount rate as the 'opportunity cost of capital', i.e. its potential value had it been invested elsewhere. Conversely, the public sector often cites the 'social-discount rate', which is calculated using the expected growth rates of consumption combined with some ethical judgments (Ranger et al., 2010). Comprehensive guidance regarding the calculation of appropriate discount rates is available in the Green Book, including the use of declining discount rates for projects that are particularly long lived (HM Treasury, 2003). Discount rates are very important, since the perceived viability of a certain project can be very sensitive to the value of the discount rate applied (Pearce et al., 2006, Boardman et al., 2006).

Furthermore, this exercise should be complemented with scenario testing of different options, environmental states and outcomes, providing a more robust assessment of current and future viability.

The success of resilience or adaptation efforts and projects is closely linked with the ability to predict the future and take anticipatory action to mitigate potential negative impacts. Future socio-environmental systems are characteristically complex and uncertain. Resolving trade-offs and anticipating outcomes becomes more challenging due to a lack of scientific knowledge and consensus on the scale and timing of anticipated changes. This is particularly apparent in the context of climate-change adaptation and the frequency and severity of extreme events (IPCC, 2014). In these situations, scenarios are increasingly utilised to guide decision-making by providing plausible projections of future climate change and its potential impacts.

Unfortunately, scenarios are not always provided with a probability of occurrence, nor is this always possible. Predicted future socioeconomic dynamics are highly uncertain and some environmental processes—such as the impact and rate of methane release from melting permafrost—remain unclear (Schuur et al., 2015). In the case of climate-change adaptation, the calculation of probabilities also requires various subjective judgements to be made regarding the model structure, parameter estimation and the use of empirical observations to constrain predictions (Frame et al., 2005, Solomon, 2007, Tebaldi & Knutti, 2007). Due to the reliance on subjective—and sometimes no—probabilities, climate-change adaptation is almost universally presented as a situation of decision-making under uncertainty.

Additionally, Smith (2007); Stainforth et al., (2007) and others have previously advised researchers and analysts to err on the side of caution when interpreting outputs of climate models in the form of probabilities. The underpinning climate models have previously been proven incompatible and inadequate at the temporal

and spatial resolution required to make robust adaptation decisions. However, it has also been highlighted that a lack of probabilistic information or perfect knowledge need not be a hindrance to adaptation or resilience (Dessai et al., 2009).

Scenarios that lack probabilities are incompatible with classical-decision theory, sometimes referred to as decision-making under risk (or utility theory). In such cases, alternative evaluation approaches must be sought.

Where probabilities are known and quantifiable, classical-decision theory can provide a powerful suite of tools for guiding decision-making. In many fields and industrial sectors, this remains the dominant approach. However, in recent years, there has been a steady decline in its popularity due to the recognition that it is largely incompatible with decision-making in situations of uncertainty. Unfortunately, evaluating the impact of climate change on an investment portfolio would require one to (i) fully describe and quantify the range of future environmental states and their probability of occurrence, (ii) have an in-depth understanding of how different environmental states and actions combine to produce outcomes; and (iii) have a comprehensive understanding of the net-benefits of these potential actions. This can be complicated in situations where the impacts of climate change emerge indirectly or are due to complex interactions between multiple actors, assets and activities, some of which may be outside one's control. The combination of these factors will require an extensive reliance on subjective probability assessments, over which analysts and decision-makers will likely disagree and dispute each other's claims and assumptions. This will result in further delay and potentially inaction (Polasky et al., 2011).

With respect to the scale and temporal resolution of adaptation investment and projects, most climate-change impacts are highly uncertain (Ranger et al., 2010). In situations of deep uncertainty, scenario planning, thresholds approach and resilience thinking can provide useful frameworks for a broad range of future environmental states. It can be particularly useful to hedge investments so they are not unduly compromised or placed at elevated risk from extreme events, sometimes referred to as "black-swan events." (Quay, 2010). Moreover, these types of approaches help analysts and decision-makers think about key social and environmental feedback effects and threshold boundaries that may negatively affect asset performance. Thus, assessments can be significantly strengthened, and multiple stakeholders can contribute to the process by offering their discrete perspectives, methods and evidence, thereby favouring the use of robust, open and inclusive decision tools such as those presented here.

Challenges for decision-making under uncertainty translate to difficulties in defining the state space, including the number and range of scenarios to include. To overcome such issues, it is generally advised to include only those variables that the investment is highly sensitive to (for example, sea-level rise in the case of coastal flood defences) and to consider plausible best- and worst-case events to characterise the variables.

The same level of attention is required when specifying any quantification method

used to inform the decision-making process. It is important to use only those metrics that are decision-relevant and to ensure that non-monetary and other evaluation criteria are utilised in situations where it is difficult to ascribe economic costs to potential impacts.

Finally, it may not be easy to select the number and type of adaptation options that are to be tested. In certain circumstances, the range of potential adaptation options could be infinite. Therefore, defining the characteristics of these options requires skills to make sure that the full range of options is explored without having to individually explore every single potential adaptation measure. Any assessment should also include risk-mitigation strategies, potential for flexible adjustment and adaptive management, lead times and asset life time (Ranger et al., 2010). These metrics will be essential in determining the overall efficiency and return on investment as, for example, an adaptive scheme could keep the overall costs of a particular adaptation to a minimum.

The field of decision-making under uncertainty has grown significantly in recent years, and this is in part due to this recognition combined with the growing accessibility to climate-change information in traditionally data-poor regions. Various distinctions can be made between decision methods suited for situations in which there is access to non-unique subjective probabilities, unique but non-additive probabilities, and no probabilities at all (Kelsey & Quiggin, 1992, Gilboa & Schmeidler, 1989, Allen et al., 2006, Gilboa, 2009).

Conclusions and Recommendations

There are two very different categories of infrastructure when measuring resilience: infrastructure that is itself resilient to future change and infrastructure that is intended to enhance the resilience of local communities. The two should be treated separately.

Community adaptation will include projects in which there is no current direct adaptation planned but the management process implemented considers future climate risk and is likely to contribute in some way to the community's ability to adapt to future climate conditions. For example, mobile-phone projects in which the provision of communications can be demonstrated as useful in the event of extreme weather or other climate-related disasters through the adoption of a disaster risk-management plan should be quantified within a risk rating.

However, within any metric, a fully quantified approach is not possible, since the future is inherently uncertain. Therefore, it is necessary to adopt a transparent use of scenario analysis. A common approach to the use of such scenarios would be highly beneficial, and if a transparent international process could be set up and managed, this may help build trust in the process and allow metrics to be used across the board.

The future of climate change along a business-as-usual trajectory presents significant dangers to the global society. Scenarios under the more extreme

impacts present not just project and infrastructure risk but planetary or existential risk for a functioning economy. Incorporating this into an infrastructural risk rating is meaningless but should nonetheless be a part of the wider discussion in the efforts to mobilise significant capital into resilience (or mitigation) investments.

Any metric to assess the resilience of infrastructure must be used alongside a suite of other metrics to assign a rating. Therefore, it is difficult to suggest a particular route, as each method used for rating is different. For projects that are designed to enhance wider resilience to climate change, key quantified metrics that should be considered include those proposed by the Green Climate Fund (Green Climate Fund, 2014).

- Environmental effectiveness: including units of human health (disability-adjusted life years (DALYs)) and units of wealth (US\$) saved and enhanced
- Cost-effectiveness: US\$/DALY and US\$ saved
- Co-benefits: US\$/unit of co-benefit
- Institutional feasibility: level of acceptance

To measure and evaluate the resilience of other infrastructure, a two-phased approach is proposed. Phase 1 is a simple measure of whether the project itself contains evidence that climate-change resilience has been considered (or not) within its planning and implementation phases. This evidence should include some discussion on management processes to assess new climate science and scenarios as they emerge and to adapt the infrastructure as needed. In Phase 2, a more qualitative measure must be adopted. Building on the methodologies outlined by TCFD, Moody's and S&P, a financial value at risk should be calculated based on a range of plausible climate scenarios. This should evaluate any aspects of resilience (or options for resilience) put in place for the infrastructure under consideration against the level of exposure (measured through a set of plausible scenarios) of that infrastructure. The interpretation of the value at risk may be qualitatively taken if the uncertainty in the scenarios based on future climate projections, or the uncertainty in adaptation options available, is too great to justify full quantification.

References

- 1 Agrawal, A. and N. Perrin. "Climate adaptation, local institutions and rural livelihoods." In *Adapting to Climate Change: Thresholds, Values, Governance*, edited by W.N. Adger, L. Lorenzoni and K.L. O'Brien, 350–67. Cambridge: Cambridge University Press, 2009. <http://www.umich.edu/~ifri/Publications/W08I6%20Arun%20Agrawal%20and%20Nicolas%20Perrin.pdf>.
- 2 Aitsi-Selmi, A., S. Egawa, H. Sasaki, C. Wannous and V. Murray. "The Sendai framework for disaster risk reduction: Renewing the global commitment to people's resilience, health, and well-being." *International Journal of Disaster Risk Science* 6, no. 2 (2015): 164–76 <http://link.springer.com/article/10.1007/s13753-015-0050-9>
- 3 Allen, M., D. Frame, J. Kettleborough and D. Stainforth. "Model error in weather and climate forecasting." *Predictability of Weather and Climate*, edited by T. Palmer and R. Hagedorn, 391–427. Cambridge: Cambridge University Press, 2006.

- 4 Asset Owners Disclosure Project, Global Climate Index 2017. Asset Owners Disclosure Project, Sydney, Australia.
- 5 Bank of England. "The impact of climate change on the UK insurance sector." A climate change adaptation report by the Prudential Regulatory Authority, London, UK. <http://www.bankofengland.co.uk/pr/Documents/supervision/activities/pradefra0915.pdf>.
- 6 Berrang-Ford, L., J.D. Ford and J. Paterson. "Are we adapting to climate change?" *Global Environ Change* 21, no.1 (2011).
- 7 Biesbroek, G.R., J.E. Klostermann, C.J. Termeer and P. Kabat. "On the nature of barriers to climate change adaptation." *Regional Environmental Change* 13, no. 5 (2013): 1119–129.
- 8 Boardman, A.E., D.H. Greenberg, A.R. Vining and D.L. Weimer. "Cost-benefit Analysis: Concepts and Practice." Upper Saddle River NJ: Prentice Hall, 2006.
- 9 Dessai, S., M. Hulme, R. Lempert and R. Pielke Jr. "Climate Prediction: A Limit to Adaptation." *Adapting to Climate Change: Thresholds, Values, Governance*, edited by W.N. Adger, L. Lorenzoni and K.L. O'Brien. Cambridge: Cambridge University Press, 2009.
- 10 Fankhauser, S. "The costs of adaptation." *Wiley Interdisciplinary Reviews: Climate Change*, 2009.
- 11 Frame, D., B. Booth B, J. Kettleborough, D. Stainforth, J. Gregory, M. Collins and M. Allen. "Constraining climate forecasts: The role of prior assumptions." *Geophysical Research Letters* 32, no. 9 (2005).
- 12 Green Climate Fund, 2014, Investment Framework, GCF/B.07/06, Meeting of the Board, 18–21 May 2014, Songdo, Republic of Korea. https://www.greenclimate.fund/documents/20182/24943/GCF_B.07_06_-_Investment_Framework.pdf/dfc2ffe0-abd2-43e0-ac34-74f3b69764c0.
- 13 H.M. Treasury. "The green book: appraisal and evaluation in central government." London: HM Treasury, 2003 (updated 2011 edition). https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf.
- 14 IIGCC. "Investment-Grade Climate Change Policy: Financing the Transition to the Low Carbon Economy." Institutional Investors Group on Climate Change (IIGCC), Investor Network on Climate Risk (INCR), Investor Group on Climate Change (IGCC) and United Nations Environment Programme Finance Initiative (UNEP FI), 2011.
- 15 IPCC. "Climate change 2014: synthesis Report. Contribution of working groups I, II and III to the fifth assessment report of the intergovernmental panel on climate change." [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)] 151. IPCC, Geneva, Switzerland, 2014.
- 16 IPCC. "Working Group II: Impacts, Adaptation and Vulnerability." IPCC, Geneva, Switzerland, 2007.
- 17 Jones, A. "Perceived barriers and policy solutions in clean energy infrastructure investment." *Journal of Cleaner Production*, 104, 297.
- 18 Jones, A., I. Allen, N. Silver, C. Howarth, C. Cameron and B. Caldecott. "Resource constraints: sharing a finite world: Implications of Limits to Growth for the Actuarial Profession." The Institute & Faculty of Actuaries, London, UK, 2013.
- 19 Kelsey, D. and J. Quiggin. "Theories of choice under ignorance and uncertainty." *Journal of Economic Surveys*, 1992.
- 20 Kemp-Benedict, E. "Shifting to a Green Economy: lock-in, path dependence, and policy options." Stockholm Environment Institute Working Paper 2014, Stockholm, Sweden.
- 21 Kolk, A., D. Levy and J. Pinkse. "Corporate responses in an emerging climate regime: the institutionalisation and commensuration of carbon disclosure." *European Accounting Review* 17, no. 4 (2008): 719–45.
- 22 Lovio, R., P. Mickwitz and E. Heiskanen. "Path dependence, path creation and creative destruction in the evolution of energy systems." In *Handbook of Research on Energy Entrepreneurship*, edited by R. Wustenhagen and R. Wuebker, 274–304. Cheltenham, UK and Lyme, US: Edward Elgar Publishing, 2011.
- 23 Matisoff, D., D. Noonan and J. O'Brien J. "Convergence in environmental reporting: Assessing the Carbon Disclosure Project." *Business Strategy and the Environment* 22, no. 5 (2013): 285–05.
- 24 Moody's. "Green Bonds Assessment." Moody's Investors Service: Methodology, New York, US, 30 March 2016.
- 25 Moody's. "Moody's approach to assessing Environmental, Social and Governance in credit analysis." Moody's Investor Service: sector in depth, London, UK, 25 October 2017.
- 26 Pearce, D., G. Atkinson and S. Mourato. "Cost-benefit analysis and the environment: recent developments." Organisation for Economic Co-operation and Development, 2016.
- 27 Pielke, R., G. Prins, S. Rayner and D. Sarewitz. "Climate change 2007: Lifting the taboo on adaptation." *Nature*, 2007.
- 28 PIDG. "Climate Change Classification Methodology." Private Infrastructure Development Group, 2012. Revised: November 2012. <http://www.pidg.org/resource-library/results-monitoring/pidg-climate-change-classification-methodology.pdf>.
- 29 Polasky, S., S.R. Carpenter, C. Folke and B. Keeler. "Decision-making under great uncertainty: environmental management in an era of global change." *Trends in ecology & evolution*, 2011.
- 30 Preston, B.L., R.M. Westaway and E.J. Yuen. "Climate adaptation planning in practice: an evaluation of adaptation plans from three developed nations." *Mitigation Adapt Strat Global Change*, 2011.

- 31 Quay, R. "Anticipatory governance: A tool for climate change adaptation." *Journal of the American Planning Association*, 2010.
- 32 Ranger, N., A. Millner, S. Dietz, S. Fankhauser, A. Lopez and G. Ruta G. "Adaptation in the UK: a decision-making process." Policy Brief, London School of Economics, 2010. <http://www.lse.ac.uk/GranthamInstitute/publication/adaptation-in-the-uk-a-decision-making-process/>.
- 33 S&P. "Proposal for a Green Bond Evaluation Tool, RatingsDirect." Standard & Poors Global Ratings, London, UK, 2016. www.standardandpoors.com/ratingsdirect.
- 34 Schmeidler, D. "Subjective probability and expected utility without additivity." *Econometrica: Journal of the Econometric Society*, 1989.
- 35 Schuur, E., A. McGuire, C. Schadel, G. Grosse, J. Harden, D. Hayes, G. Hugelius, C. Koven, P. Kuhry and D. Lawrence. "Climate change and the permafrost carbon feedback." *Nature*, 2015.
- 36 Smith, J.B., H. Schellnhuber, M.M.Q. Mirza, S. Fankhauser, R. Leemans, E. Lin, L. Ogallo, B. Pittock, R. Richels and C. Rosenzweig. "Vulnerability to climate change and reasons for concern: a synthesis." Chapter 19, in McCarthy, J.J., Canziani, O.F., Leary, N.A., Dokken D.J. and White, K.S., eds., *Climate Change 2001: Impacts, Adaptation, and Vulnerability*, 913–67. Cambridge University Press, 2001.
- 37 Smith, L. "Chaos: a very short introduction." Oxford University Press, 2007.
- 38 Solomon, S. "Climate change 2007-the physical science basis." Working group I contribution to the fourth assessment report of the IPCC. Cambridge University Press, 2007.
- 39 Stainforth, D.A., M.R. Alle, E.R. Tredger, L.A. Smith. "Confidence, uncertainty and decision-support relevance in climate predictions." *Philos Trans A Math Phys Eng Sci*, 2007; 2015.
- 40 TCFD. "Recommendations of the Task Force on Climate-related financial disclosures." Task Force of Climate Related Financial Disclosures, London, UK, June 2017.
- 41 Tebaldi C. and R. Knutti. "The use of the multi-model ensemble in probabilistic climate projections." *Philos Trans A Math Phys Eng Sci*, 2010. doi: 7361658H76MP9708 [pii].
- 42 Termeer, C., R. Biesbroek and M. Van den Brink. "Institutions for adaptation to climate change: comparing national adaptation strategies in Europe." *European Political Science*, 2012.
- 43 Tompkins, E.L., N.W. Adger, E. Boyd, S. Nicholson-Cole, K. Weatherhead and N. Arnell. "Observed adaptation to climate change: UK evidence of transition to a well-adapting society." *Global Environmental Change* 20 (2010): 627–35. <http://www.sciencedirect.com/science/article/pii/S0959378010000415>.
- 44 Vivid Economics. "Delivery vehicle options for the International Climate Fund," Report prepared for ICF spending departments. Vivid Economics, London, UK, January 2014.

Ratings for Renewable Energy: Metrics and Evaluation for Renewable Energy/Infrastructure Project Risk

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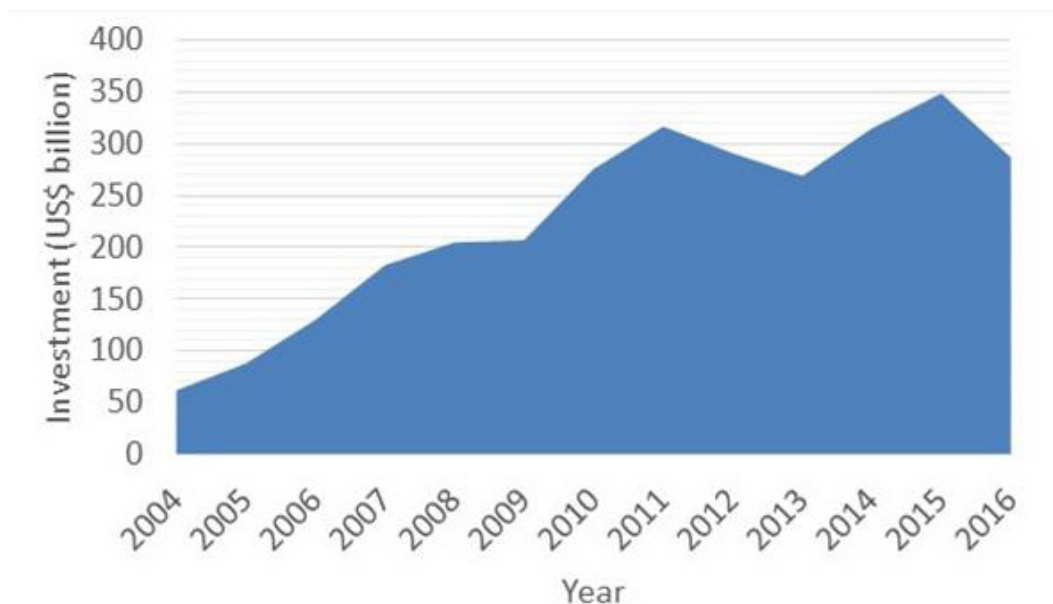
Background

Over the next few decades, there will be a huge requirement for capital investment into energy infrastructure, in both supply and consumption. Approximately US\$270 trillion is due to be invested into the energy system between 2007 and 2050 (IEA, 2009). Additionally, the scale of opportunity to invest in solutions that address global sustainability challenges, such as climate change, is often seen as a new technology revolution (Linnenluecke et al., 2016). While estimates vary, they broadly coalesce around the need for an additional US\$1 trillion per annum in investment required in energy infrastructure over the next 30 years. It is crucial to target policy and business interventions to enable capital to flow into these investments and, consequently, to understand and measure the risk associated with them.

Over the past few decades, resource and energy efficiency have dominated environmental finance. Corporate investment into best practices has often been for cost-saving purposes, not based on external or specifically environmental drivers. However, additional incentives, such as the creation of a trading scheme to put a price on carbon (Convery & Redmond, 2007), have driven more investment into efficiency than would otherwise have occurred.

Globally, clean-energy investment crossed US\$200 billion in 2010 (Frankfurt School-UNEP Centre, 2013; PEW Charitable Trust, 2010; WEF, 2011), with investments in infrastructure accounting for over half. China saw the highest proportion of this

Figure 1: Investment in Clean Energy (2004-2016)



Source: Bloomberg New Energy Finance, 2017.

investment at US\$54 billion. Investments amounted to US\$350 billion in 2015 but declined by 18 percent in 2016 (See Figure 1). Asia receives the bulk of investments, just under half of the total investment in 2016. Renewable energy capacity investments in 2016 reached US\$227 billion, with the vast majority being in wind and solar technologies (See Figure 1). These investments represent a substantial market.

Despite this large investment market, there is a distinct gap between what is required and what is being delivered. In particular, developing countries' requirement for investment is estimated to be US\$240–640 billion per annum by 2030, of which only 40 percent is currently being invested by both public and private sources (Vivid Economics, 2014). Private finance is relatively smaller in developing countries than in developed countries. Estimates put private investment at 88 percent of the total in developed countries and 57 percent in developing countries (Vivid Economics, 2014).

Most imagined scenarios for combating climate change include a significant role for carbon capture and storage or biofuel (to enable biomass carbon capture and storage), which, too, are inadequately funded. Additionally, while there has been a global rise in clean-energy investment, much of it has been concentrated geographically, particularly in China. A significant part of the increase in investment is due to public-sector organisations, such as state utilities (Mazzucato & Semieniuk, 2018), increasing their direct investment instead of creating of a supportive policy regime to attract more private-sector finance.

When examining climate-change related investments globally, institutional investors are found to be a negligible source of total investment, the majority (over US\$120 billion per annum) of investment being from project developers and corporates (just under US\$80 billion per annum). However, as part of the United Nations Climate Summit, led by the UN Secretary General, several private-investment funds made commitments to increase their investments in low-carbon sectors by 2020. Substantial progress was made in the first year (See Table 1).

Table 1: Private-Sector Commitments made during the UN Climate Summit in 2014 and Their Delivery during the First Year (UN, 2015)

Organisation	Original commitment/target	Progress over the last year	Assessment
International Cooperative and Mutual Insurance Federation (ICMIF)/ International Insurance Industry	Doubling of 'climate-smart' investments to reach US\$84 billion by COP21, and a tenfold increase by 2020	US\$109 billion by July 2015, expected to reach US\$130 billion by October, 2015	Reached initial target
Portfolio Decarbonisation Coalition	To mobilise investors to commit to collectively carbon footprint US\$500 billion of Assets under Management and to decarbonise US\$100 billion of these assets	Decarbonisation commitment of US\$63 billion reached, expected to increase to US\$75 billion by October, 2015; Investors have committed via the UNPRI-organised Montréal Pledge to carbon footprint US\$3 trillion of investments	On track
CalSTRS, APG, Pension Danmark	To allocate more than US\$31 billion to 'low-carbon' investments by 2020	Currently around US\$29 billion allocated, an increase of US\$11 billion over the year	On track
Swiss Re	Advise 50 sovereigns and sub-sovereigns on climate risk resilience and to offer them protection of US\$10 billion against this risk	Advised nine sovereigns and sub-sovereigns (seven from developing countries) and offered protection of more than US\$1.5 billion (of which US\$1.1 billion offered to developing countries)	On track
Bank of America	Catalytic Finance Initiative (CFI): US\$10 billion of new investment in high-impact clean energy products by 2022	Closed around 10 deals totalling US\$1.5 billion (of which US\$250m from its balance sheet); US\$400m of deals in emerging markets.	On track

Some analysts argue that trustees of institutional funds can only take social or environmental considerations into account (Sandberg, 2011) in very specific cases. However, counter arguments suggest that they are already legally required to do so (Sethi, 2005).

Increasingly, the renewable-energy sector is seen as a maturing asset for investment. The risk perceptions associated with certain technology deployment has been changing over time. The price of technology-generated electricity is also changing, with many now being grid comparable, leading to an increased appetite for investment. Mazzucato and Semieniuk (2018) classified the risk associated with a number of renewable technologies as either low, medium or high (See Table 2).

The private sector will continue to invest significant capital into energy projects over the next few decades. Thus, policymakers must figure out how to influence strategic choices towards renewable energy investments and away from conventional energy investment (Wustenhagen & Menichetti, 2012).

To scale up investment into renewable infrastructure, it is crucial to have a long-term stable policy (IIGCC, 2011, UNEP & Partners, 2009). According to investors, this is currently lacking (Jones, 2015). Low-carbon investments offer both opportunities and risks, which require a different approach to policy development (Foxon, 2011; Hilden, 2011; Safarzynska et al., 2012). Policy design is critical (Wustenhagen &

Table 2: Technology Risk Classification for Various Renewable Energy Technologies in 2014

Technology		Risk
Wind	Onshore	Low
	Offshore	High
Solar	Crystalline-silicon PV	High (2004–06), medium (2007–09), low (2010–14)
	Thin-film PV	High (2004–09), medium (2010–14)
	Concentrator PV	High
	Concentrated Solar Power	High
Biofuels	First generation	Low
	Second generation	High
Biomass and waste	Incineration	Low
	Other biomass	Medium
Geothermal		Medium
Marine		High
Small hydro		Low

Source: Mazzucato & Semieniuk, 2018.

Menichetti, 2009) in encouraging investment in renewables. The lack of sufficient policy design leads to badly designed markets, which, in turn, results in retrospective policy changes, undermining trust in the investment climate (Jones, 2015).

Investment Metrics

The Private Infrastructure Development Group (PIDG, 2012) have developed a methodology for assessing the mitigation potential of infrastructure projects, using a three-tier system for classification:

- Tier 1: Projects whose principal objective is to mitigate climate change and/or whose actions can be considered a step-change in terms of reducing GHG emissions
- Tier 2: Projects where climate-change mitigation forms an important part of the project scope and/or where GHG emission reductions are incremental
- Tier 3: Projects that do not have climate-change mitigation co-benefits or are only likely to lead to indirect mitigation co-benefits

These classifications are currently qualitative. Assessing carbon savings, crucial for renewable-energy investments, as part of a quantified approach to developing a metric is difficult, since any emissions reduction is measured in relation to a 'business as usual' (BaU) scenario. The BaU scenario is subjective, specifically in developing countries, where it is unclear what technologies are being substituted and how the economic growth and development aspirations of countries should be factored into defining these scenarios. Recommendations for how to use and create scenario analysis are currently under development (TCFD, 2017).

Increasingly, many projects, especially those blended with private-sector capital, require reporting (in some form or another) of quantified emission reductions (see for example, Bank of England, 2015 and ShareAction, 2015). Therefore, for renewable projects, a quantitative measure of emission reduction over BaU potential is critical. The assumptions underpinning the BaU scenario/s and their quantification must be disclosed. However, this quantification may be difficult, particularly in cases where assumptions have to be made about alternative future investments and energy options or where the emissions from existing (very disperse) energy usage have not been measured. Nonetheless, detailed guidelines have already been developed (Green Climate Fund, 2014a), and the multilateral development banks are using a toolkit developed by the International Finance Corporation to assess their emissions savings (IFC, 2013). An excel worksheet is available online (IFC, 2014).

There are many ways to quantify emissions savings, such as the indicator developed and proposed under the Green Climate Fund (2014b, 2014a), which includes tonnes of carbon dioxide equivalent (tCO₂-eq) per dollar invested as a measure of efficiency of investments made (Green Climate Fund, 2014b).

For power-generation projects, four main rating factors are considered (Moody's, 2017a):

- Predictability of Cash Flows
- Competitiveness/Regulatory Support
- Technical and Operating Risks/Vendor Profile
- Key Financial Metrics

As noted above, the importance of regulatory support and long-term commitments from governments to see an energy transformation is vital to ensure a risk measure that is favourable towards renewable-energy investments.

An additional consideration is the 'paradigm shift potential' (Green Climate Fund, 2014b), i.e. if the project provides demonstration potential for a new technology or deployment of a technology in a new geography. For example, in their Green Bond rating proposal, Standard & Poors (S&P, 2016) uses a net-benefit approach to measure the impact of a project. Part of this approach includes measuring the potential for the technology to provide a systemic change towards a green economy, as well as investments that extend the life of fossil fuel use.

The concept of stranded assets (Carbon Tracker, 2013) is gaining significant traction across the investment community, including multilateral development banks (Caldecott, 2015). For example, the valuation of any power station whose primary source of fuel is coal, oil or gas could be materially impacted by future regulation. Such regulation can include international climate agreements, national environmental regulation or international trade agreements. International trade regulations, under the World Trade Organisation, are increasingly subject to discussions focusing on improving the coherence of climate and trade policies (WTO, 2016) and may, in future, include the concept of embodied emissions.

A recent announcement at the UN Conference of the Parties in Mexico by the Climate Vulnerable Forum represents 48 of the most vulnerable countries in the world and aims to make these countries 100 percent renewable by 2050 (Payton, 2016). As these countries implement policies to achieve this goal, the concept of stranded assets may become more material than they currently are in some developed countries. Therefore, projects that have greenhouse gas emissions, which have not been actively considered but may materially impact the valuation of the asset under future (carbon) regulation, should have a considerable risk weighting attached to them.

Discussion

On 4 December 2017, a workshop was held at the Institute and Faculty of Actuaries in London, UK. The workshop brought together 16 experts in risk and investment. The overarching aim was to explore how risk can potentially drive private capital, in all its forms, to climate action projects. The workshop started with a discussion of the constraints and barriers to asset owners and their investment managers, making significant inroads into infrastructure investments in emerging market economies. However, the bulk of the discussions focused on risks and risk metrics, how they are used in investment decisions and how they are both a barrier and an opportunity for scaling up such investments. This section builds on those discussions.

When developing metrics or measures to increase investments towards renewable energy projects, it is important to distinguish between ‘investment managers’ (asset gatherers) who require increased human capacity to scale up investments and ‘asset owners’ who need to see an increase in demand for their capital towards these projects. Asset owners must also make it clear that they want to make these investments, although many argue that they have been calling for long-term policy changes to enable this shift for over a decade. Predictability of the regulatory framework is key for risk management. However, there is now evidence of good and best practices in renewable-infrastructure investment, as well as divestment away from fossil fuels, the most recent of which is the Norwegian pension fund that has created a green-investment window. The move to renewables is also more likely with the price of electricity from renewables approaching grid parity, as it has in a number of countries. Grid parity price changes the main risk from counter party/sovereign risk to market risk as projects become less reliant on government subsidies for the returns.

Several examples of public-private partnerships now exist. Institutional investors have taken early issues of green bonds from organisations such as the World Bank and International Finance Corporation. New private equity and infrastructure public-private partnerships have been set up, which utilise the knowledge of public organisations in investing in developing and emerging markets to reduce risk and create diversified risk by enabling investments across countries. However, if these investments are in partnership with national development banks, they do not alleviate any country risk.

To increase the supply of capital, institutional investor governance should better incorporate the full range of risk analysis and understanding as outlined here. Different governments are taking different approaches to encourage this, e.g. the French top-down regulation on governance and the UK’s Bank of England bottom-up approach to risk-management advice. However, regulation can often be a deterrent to more proactive measures from investors and the UK’s Prudential Regulation Authority (PRA) approach to capital adequacy requires investors to prove a detailed understanding of risks and how to model them, which can often take six months to approve new risk models. Indeed, even if the existing models are incorrect (they do not take into account climate change), including new models is difficult. Therefore, a more pragmatic and partnership approach is necessary to speed up the transition to renewables.

In developing countries, while there is an increasing pool of investment opportunities, there is still not enough supply of projects at the required aggregated scale. Therefore, there is little incentive to invest in human capital within asset management firms (an exception being boutique firms). Increasing this pool of opportunities to create risk diversification should also go hand-in-hand with learning lessons from these projects so as to better structure investment opportunities. For example, future partnerships should involve the full life cycle of the projects, with institutional investors as part of the refinancing and project developers providing the construction finance. Structuring investments over a 30-year project is not straightforward, and new approaches and techniques are needed to measure and

handle risk over this duration.

This is not just a problem for developing countries. There is a lack of eligible assets in Europe as well. While technology risk has reduced, and the cost of technologies has dramatically fallen, these have not been fully incorporated into investment metrics as yet. The risk associated with these technologies is not being priced accurately. Moreover, the risk in investments is changing rapidly with key markets such as the UK and the US seeing dramatic changes in their risk profiles, given Brexit and the election of President Trump.

In the short term, it is necessary to make existing projects investment-grade or to create the conditions in which investors are comfortable investing in sub-grade projects. In addition to technology risks, there is a range of country-specific risks that can often be more important in risk metrics. These include:

- Currency risk (hedge cost is high)
- Political risk
- Credit strength of counter parties
- Legal frameworks
- Transparency

To hedge country-risk, long-dated debt denominated in the national currency is crucial. Thus, countries without long-dated debt are at a disadvantage, even more so in the case of developing countries. Approximately half of the defaults in emerging market investments are related to country risk, whereas half the defaults in developed markets are due to project risk.

Over the last 10 years, emerging market investments have become a necessity for asset owners to ensure diversified risk exposure. In addition, it has become necessary to move away from hyper-liquid equity markets and invest more in infrastructure. Infrastructure investment naturally aligns with the long-term liabilities of institutional investors, although the way they are regulated can sometimes make this difficult to show in practice. The ongoing political process within the UN Framework Convention on Climate Change Conference of the Parties makes renewable energy transition more attractive, and the fossil fuel industry is now seen as a sunset industry. Even with new technologies and techniques being developed in fossil fuels, the recent experience of investing in areas such as fracking has shown that these have significant risk associated with them. Therefore, the direction of travel for investors is clear, although it takes a long time for this to be institutionalised within investment organisations.

The use of metrics to assess risk on renewable infrastructure projects is an emerging competence within the finance sector. While both S&P and Moody's have transparent approaches to risk ratings of power-generation projects, and both have measures to assess climate-change resilience, the history of using these metrics is limited, with the majority of ratings having been done since 2016. Green bonds associated with renewable infrastructure is a rapidly growing market and—with the issuance of local standards in countries such as India in 2016 and the adoption

of common principles in 2017—more evidence on the actual risk in this sector will emerge over the next few years (Moody's, 2017b). However, the volume of green bonds rated is still quite low, with Moody's only having rated 25 transactions by the end of 2017 (Moody's, 2017b).

Fossil-fuel investments and metrics have decades of data within each organisation. Thus, learning from the use, including their accuracy, can be built upon. The key difference between renewable-infrastructure metrics and existing power-project metrics is the need for transparency through reporting on emissions saved. To scale up renewables, it is critical to share data and information across organisations to help achieve the same scale of knowledge and learning. The perception of the usefulness of the current index measures (such as those used by Bloomberg New Energy Finance and Ernst & Young) are mixed, and the methodology behind the index are not transparent. Therefore, there may be a role to create a new public body, or charitable body, that can create and manage a transparent index or metric to measure these risks, collate data from projects and build capacity within the finance sector. The World Bank has launched a pilot, although this only focuses on developing countries, the need to aggregate data between developing and developed countries being key.

Conclusion

There still exists a fundamental policy uncertainty regarding energy transition. Governments have been hesitant to 'pick winners' within the renewables sector, although they do this in other sectors all the time. The issue of carbon entanglement, where some governments receive substantial revenues from the fossil-fuel sector, must also be factored into future scenarios and risk measures.

There is a need for greater transparency and coordination to achieve the necessary scale in as short a time as possible. Compared to 10 years ago, there are currently several examples of good and best practices. Thus, there is a platform from which to build future partnerships for investment. The next 10 years will likely look very different.

Recommendation for a Metric Framework

Creating a detailed metric that will allow transparent evaluation of renewable-energy infrastructure projects requires a process that engages relevant investors to ensure its wide adoption. The following is suggested as an initial proposal to be used as a basis to kickstart such discussions. These metrics should be implemented alongside standard infrastructure risk metrics.

Carbon Emissions Saving over Business as Usual

- Use IFC Carbon Emissions Estimation Tool (IFC, 2014) as the basis

Regulatory Exposure Score

- 1=dependent on subsidy support; 0=grid comparable
- This score to be used to weight a Country-Risk Score (such that a technology that is not dependent on regulatory support has lower risk associated with it than one that is dependent on regulatory support)

Paradigm Shift Potential

- Scale of 0 to 10, on whether the particular project/asset demonstrates a contribution to radical change in future energy transition scenarios

Stranded asset potential

- 1=potential to be stranded, 0=not stranded
- This score to weight the overall investment-risk calculation depending on timescales involved

References

1. Apostolakis, G., Kraanen, F., van Dijk, G., 2016 Pension beneficiaries' and fund managers' perceptions of responsible investment: a focus group study, *Corporate Governance*, 16 (1), 1-20
2. Asset Owners Disclosure Project, 2017, *Global climate index 2017*, Asset Owners Disclosure Project, Sydney, Australia
3. Bank of England, 2015, The impact of climate change on the UK insurance sector, A climate change adaptation report by the Prudential Regulatory Authority, London, UK <http://www.bankofengland.co.uk/pradefra0915.pdf>
4. Bauer, R., Koedijk, K., Otten, R., 2005, International evidence on ethical mutual fund performance and investment style, *Journal of Banking and Finance*, 29 (7), 1751-1767
5. Berry, T.C., Junkus, J.C., 2013. Socially responsible investing: an investor perspective, *J Bus Ethics*, 112, 707-720
6. Bloomberg New Energy Finance, 2017, *Global trends in clean energy investment*, Bloomberg New Energy Finance, London, UK
7. Brzeszczynski, J., Ghimire, B., Jamasb, T., McIntosh, G., 2016, Socially responsible investment and market performance: the case of energy and resource firms, *Cambridge Working paper in Economics 1609*, University of Cambridge, UK
8. Borgers, A.C.T., Pownall, R.A.J., 2014, Attitudes towards socially and environmentally responsible investment, *Journal of Behavioural and Experimental Finance*, 1, 27-44
9. Caldecott, B., 2015, Stranded Assets and Multilateral Development Banks, Inter-American Development Bank https://publications.iadb.org/bitstream/handle/11319/7277/IDB_strandedassets_brik.pdf?sequence=1
10. Carbon Tracker, 2013, Unburnable carbon 2013: wasted capital and stranded assets, Carbon Tracker & Grantham Research Institute, London School of Economics
11. Convery, F., Redmond, L., 2007, Market and Price Developments in the European Union Emissions Trading Scheme, *Review of Environmental Economics and Policy*, 1, (1), 88-111
12. Costanza, R., de Groot, R., Sutton, P., van der Ploeg, S., Anderson, S.J., Kubiszewski, I., Farber, S., Turner, R.K., 2014, Changes in the global value of ecosystem services, *Global Environmental Change*, 26, 152-158
13. Farley, J., 2008, The role of prices in conserving critical natural capital, *Conservation Biology*, 22 (6), 1399-1408
14. Frankfurt School-UNEP Centre, 2013. Global Trends in Renewable Energy Investment 2013. *Frankfurt School-UNEP Centre & Bloomberg New Energy Finance*

15. Foxon, T.J., 2011. A coevolutionary framework for analysing a transition to a sustainable low carbon economy. *Ecol. Econ.* 70 (12), 2258-2267.
16. Gamel, J., Menrad, K., Decker, T., 2016, Is it really all about the return on investment? Exploring private wind energy investors' preferences, *Energy Research & Social Science*, 14, 22-32
17. Getzner, M., Grabner-Kräuter, S., 2004, Consumer preferences and marketing strategies for "green shares": Specifics of the Austrian market, *International Journal of Bank Marketing*, 22 (4), 260-278
18. Gond, J-P., Piani, V., 2012, Enabling institutional investors' collection action: the role of the Principles for Responsible Investment Initiative, *Business & Society*, 52 (1), 64-104
19. Green Climate Fund, 2014a, Decisions of the Board – Eighth Meeting of the Board, 14-17 October 2014: Annex VIII, Bridgetown, Barbados https://www.greenclimate.fund/documents/20182/24946/GCF_B.08_45_-_Decisions_of_the_Board_-_Eighth_Meeting_of_the_Board__14-17_October_2014.pdf/1dd5389c-5955-4243-90c9-7c63e810c86d
20. Green Climate Fund, 2014b, Investment Framework, GCF/B.07/06, Meeting of the Board, 18-21 May 2014, Songdo, Republic of Korea https://www.greenclimate.fund/documents/20182/24943/GCF_B.07_06_-_Investment_Framework.pdf/dfc2ffe0-abd2-43e0-ac34-74f3b69764c0
21. Gregory, A., Mataka, J. and Luther, R., 1997, Ethical unit trust financial performance: small company effects and funds size effects, *Journal of Business Finance and Accounting*, 24 (5), 705-725
22. Grubb, M., Neuhoof, K., 2006, Allocation and competitiveness in the EU emissions trading scheme: policy overview, *Climate Policy*, 6 (1), 7-30
23. Hilden, M., 2011. The evolution of climate policies e the role of learning and evaluations. *J. Clean. Prod.* 19, 1798-1811.
24. Hiss, S. (2013), Responsible investing as social innovation, in Osburg, T. and Schmidpeter, R. (Eds), *Social Innovation, CSR, Sustainability, Ethics & Governance*, Springer, Berlin, Heidelberg, 229-237
25. IEA, 2009. World Energy Outlook 2009. International Energy Agency.
26. IFC, 2011, Climate Finance: engaging the private sector, International Finance Corporate, Washington DC, USA
27. IFC, 2013, IFC Greenhouse Gas Reduction Accounting Guidance for Climate-Related Projects, International Finance Corporation, Washington DC, USA <https://www.ifc.org/wps/wcm/connect/21d21b80423bdbf19f39bf0dc33b630b/IFC+GHG+Reduction+Accounting+Guidance.pdf?MOD=AJPERES>
28. IFC, 2014, IFC Carbon Emissions Estimation Tool (CEET), International Finance Corporation, Washington DC, USA https://www.ifc.org/wps/wcm/connect/9b74ef8043e641679e7dbe869243d457/IFC_CEET_Feb2014.xlsm?MOD=AJPERES
29. IIGCC, 2011. Investment-Grade Climate Change Policy: Financing the Transition to the Low Carbon Economy. Institutional Investors Group on Climate Change (IIGCC), Investor Network on Climate Risk (INCR), Investor Group on Climate Change (IGCC), & United Nations Environment Programme Finance Initiative (UNEP FI)
30. Jones, A., 2015, Perceived barriers and policy solutions in clean energy infrastructure investment, *Journal of Cleaner Production*, 104, 297
31. Jones, A., Phillips, A., 2016, Voluntary business engagement in climate change: a study of the ClimateWise principles, *J Cleaner Production*, 137, 131-143
32. Jones A., Allen, I., Silver, N., Howarth, C., Cameron, C., Caldecott, B., 2013, Resource constraints: sharing a finite world: Implications of Limits to Growth for the Actuarial Profession, The Institute & Faculty of Actuaries, London, UK
33. Kallis, G., Gomez-Baggethun, E., Zografos, C., 2013, To value of not to value? That is not the question, *Ecological Economics*, 94, 97-105
34. Kemp-Benedict, E., 2014, Shifting to a Green Economy: lock-in, path dependence, and policy options, *Stockholm Environment Institute Working paper 2014-08*, Stockholm, Sweden
35. Kolk, A., Levy, D., Pinkse, J., 2008, Corporate responses in an emerging climate regime: the institutionalisation and commensuration of carbon disclosure, *European Accounting Review*, 17 (4), 719-745
36. Linnenluecke, M.K., Smith, T., McKnight, B., 2016, Environmental finance: a research agenda for interdisciplinary finance research, *Economic Modelling*, 59, 124-130
37. Lovio, R., Mickwitz, P., Heiskanen, E., 2011, Path dependence, path creation and creative destruction in the evolution of energy systems. In Wustenhagen, R., Wuebker, R. (Eds.), *Handbook of Research on Energy Entrepreneurship*. Edward Elgar Publishing, Cheltenham, UK and Lyme, US, 274–304
38. Mallin, C., Sadoumi, B. and Briston, R., 1995, The financial performance of ethical investment funds, *Journal of Business Finance and Accounting*, 22 (4), 483-496
39. Majoch, A.A.A., Hoepner, A.G.F., Hebb, T., 2017, Sources of stakeholder salience in the Responsible Investment movement: why do investors sign the Principles for Responsible Investment?, *J Bus Ethics*, 140, 723-741
40. Matisoff, D., Noonan, D., O'Brien, J., 2013, Convergence in environmental reporting: assessing the Carbon Disclosure Project, *Business Strategy and the Environment*, 22 (5), 285-305

41. Mazzucato, M., Semieniuk, G., 2018, Financing renewable energy: who is financing what and why it matters, *Technological forecasting & Social change*, 127, 8-22
42. Mo, J., Agnolucci, P., Jiang, M., Fan, Y., 2016, The impact of Chinese carbon emission trading scheme on low carbon energy investment, *Energy Policy*, 89, 271-283
43. Moody's, 2017a, Power Generation Projects, Moody's Investors Service: Rating Methodology, 16 March 2017, New York, US
44. Moody's, 2017b, FAQ: The green bond market and Moody's Green Bonds Assessment, Moody's Investors Service, 29 November 2017, New York, US
45. Nelson, R. R., & Winter, S. G. (1982). An evolutionary theory of economic change: Harvard University Press.
46. Payton, 2016, Nearly 50 countries vow to use 100% renewable energy by 2050, Climate Vulnerable Forum, <http://www.thecvf.org/countries-vow-100-renewable-by-2050/>
47. PEW Charitable Trust, 2010. Who's Winning the Clean Energy Race?, 2010 ed. *G-20 Investment Powering Forward*.
48. Phelan, L., Henderson-Sellers, A., Taplin, R., 2010, Climate change, carbon prices and insurance systems, *International Journal of Sustainable Development & World Ecology*, 17 (2), 95-108
49. PIDG, 2012, Climate Change Classification Methodology, Revised: November 2012, Private Infrastructure Development Group <http://www.pidg.org/resource-library/results-monitoring/pidg-climate-change-classification-methodology.pdf>
50. Renneboog, L., Horst, J.T., Zhang, C., 2008a, Socially responsible investments: institutional aspects, performance and investor behaviour, *Journal of Banking and Finance*, 32, 1723-1742
51. Renneboog, L., Horst, J.T., Zhang, C., 2008b, The price of ethics and stakeholders governance: the performance of socially responsible mutual funds, *Journal of Corporate Finance*, 14 (3), 302-322
52. S&P, 2016, Proposal for a Green Bond evaluation tool, S&P Global Ratings, 2 September 2016, London, UK
53. Safarzynska, K., Frenken, K., van d.Bergh, J., 2012. Evolutionary theorizing and modeling of sustainability transitions, *Res. Policy*, 41 (6), 1011-1024
54. Sandberg, J., 2011, Socially responsible investment and fiduciary duty: Putting the freshfields report into perspective, *Journal of Business Ethics*, 101(1), 143–162
55. Sandberg, J., Juravle, C., Hedesstrom, T. M., Hamilton, I., 2009, The heterogeneity of socially responsible investment, *Journal of Business Ethics*, 87(4), 519–533
56. Scholtens, B., 2014, Indicators of responsible investing, *Ecological indicators*, 36, 382-285
57. Sethi, S.P., 2005, Investing in socially responsible companies is a must for public pension funds – because there is no better alternative, *Journal of Business Ethics*, 56, 99-129
58. ShareAction, 2015, Carbon Risk Exposure: measuring and managing risks, Investor Briefing, Share Action, London, UK <http://action.shareaction.org/page/-/ShareActionCarbonFootprintingInvestorBriefing.pdf>
59. Sparkes R., 2002, Socially responsible investment: a global revolution. Wiley, Chichester
60. Sparkes, R., 2001, Ethical investment: whose ethics, which investment, *Business Ethics*, 10 (3), 194-205
61. Sparkes, R., Cowton, C.J., 2004, The maturing of socially responsible investment: a review of the developing link with Corporate Social Responsibility, *Journal of Business Ethics*, 52, 45–57
62. TCFD, 2017, Recommendations of the Task Force on Climate-related financial disclosures, Task Force of Climate Related Financial Disclosures, June 2017, London, UK
63. Temel, A., Jones, A. Jones, N., 2017, Is monetisation effective in the conservation of ecosystems?, *Ecological Economics*, (submitted)
64. UN, 2015, Trends in Private Sector Climate Finance, Report Prepared by the Climate Change Support Team of the United Nations Secretary-General on the progress made since the 2014 Climate Summit
65. UNEP and Partners, 2009. Catalysing Low-Carbon Growth in Developing Economies, Public Finance Mechanism to Scale up Private Sector Investment in Climate Solutions. United Nations Environment Programme (UNEP) and Partners
66. Vivid Economics, 2014, Financing Green Growth, June, 2014, Vivid Economics, London, UK
67. WEF, 2011, The Green Investing 2011: Reducing the Cost of Financing. World Economic Forum
68. Winnett, A., Lewis, A., 2000, You'd have to be green to invest in this: popular economic models, financial journalism, and ethical investment, *Journal of Economic Psychology*, 21 (3), 319-339
69. WTO, 2016, Several WTO members call for further work on trade and climate policy coherence, World Trade Organization, https://www.wto.org/english/news_e/news16_e/envir_30jun16_e.htm
70. Wustenhausen, R., Menichetti, E., 2012, Strategic choices for renewable energy investment: conceptual framework and opportunities for further research, *Energy Policy*, 40, 1-10

The Political Economy of Basel

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The Driving Questions

Ten years after the financial crisis, and eight years after the draft Basel-III guidelines were first released, there is an apparently broad consensus in favour of prudential regulations that seek to minimise the possibility and effect of another 2008-style crisis. Macro-prudential regulations, in particular, have had some unintended and some foreseeable but collateral effects, including on cross-border long-term lending. These effects, including the collapse of transnational bank-mediated project finance, have the potential to greatly hamper the efforts of developing countries to build high-quality, climate-sensitive sustainable infrastructure, and to meet the demands of their populations for better provision of social goods. Yet such a trade-off – between international financial stability and the Paris targets, or between such stability and the Sustainable Development Goals – is rarely made explicitly. Effective policymaking requires clear trade-offs. And an inability to examine such trade-offs usually reveals institutional deficiencies in the policymaking process. What is the political economy of Basel? What interests and incentives drive the making of macro-prudential regulation? Are a wide enough range of concerns represented at the time decisions are made about the norms guiding international finance and banking?

Who is on the Basel Committee?

As with any major institutional change, it is possible to better understand the final structure of Basel-III by examining the incentives and constraints of the interest

groups involved in its creation. It is possible then to compare the incentives of these decision-makers, serving in a sense as the agents of all stakeholders in the international financial system, with those of their principals to understand how and why the final outcome might be skewed.

The Basel Committee on Banking Supervision (the Committee or BCBS) has 45 members from 28 jurisdictions. Of these, 27 are central banks or monetary authorities (more than half of which are from the developed world).¹ Most of the remaining members are financial and banking regulators, particularly in countries which – unlike India – have separated that function from the central bank. It has a single-point agenda: financial stability. To achieve that, it has one main tool: the setting of global standards, to which individual countries can then sign up. Although such standards are dignified with the term “accord”, they have no immediate legal force. It is thus important to note that Basel requirements are essentially voluntary. How they are implemented – indeed, if they are implemented at all – is up to the various domestic regulators and governments. This fact will play a role when we examine the political economy of the implementation of Basel recommendations, as opposed to their design.

What is the domestic political economy of macro-prudential regulation?

The immediate question that arises is whether the Basel committee, and the various drafting sub-groups, have a structure and incentives analogous to domestic drafters of similar regulation.

Consider first the case of India, where the previous government set up a Financial System Legislative Reforms Commission with wide-ranging talent from a variety of sectors, including not only banking and regulation, but also academia and government. The FSLRC’s recommendations² for the management of systemic risk are interesting: it suggested giving statutory status to the Financial Stability and Development Council that had set up following the Raghuram Rajan report on financial sector reforms in 2008. The FSDC would be empowered to deal with systemic risk and regulatory arbitrage – but, as the name suggests, would have to balance stability and prudential regulation with the development of and inclusion in the financial system. To that end, it includes both members of the executive and of the monetary authorities, as well as the heads of various regulatory bodies. (We will pass over the unseemly tussle³ as to whether it would be steered out of the Reserve Bank or India or the Union finance ministry, merely pointing out that the existence of such a disagreement indicates that it was clearly understood that macro-prudential decisions were more than just the business of central bankers.) It is true that, over time, the Subcommittee of the FSDC headed by the governor has taken over much of the executive function of the overall committee. Yet there is an explicit understanding that there are trade-offs involved in the operation of macro-prudential policy. The RBI reported this mechanism to the Bank of International Settlements thus: “The competences of the FSDC, FSDC-SC and the regular interactions of the Ministry of Finance with financial sector regulators are considered adequate to deal with trade-offs, if any, between stability, development and inclusion.”⁴

In India, Parliament and its Subcommittees have less of a presence in this process than in some other jurisdictions.⁵ In the United States, for example, the Board of Directors of the Federal Reserve, as well as other agencies including the Federal Deposit Insurance Corporation and the Comptroller of the Currency, have considerable responsibility for dealing with issues of systemic risk. In the end, the Fed, through its responsibility for large banks, acts as the macro-prudential regulator of first resort.⁶ However, they are constrained in two ways. First, they have to answer directly, through hearings, to subcommittees of the US Congress. Second, they are also members of the Financial Stability Oversight Council, chaired by the Secretary of the Treasury. While the FSOC is yet to come into its own, the US Congress has taken its powers seriously in the past. In the 2000s, for example, it pushed for higher capital standards than the Fed believed were necessary under Basel-II. In the 1990s, it used its control of the housing finance regulator's budget to minimise the latter's ability to constrain risk-taking in Fannie Mae and Freddie Mac, the public-sector housing finance giants.⁷

In the United Kingdom, the Financial Policy Committee is perhaps the clearest example of the systematic weighing of both the costs and benefits of macro-prudential actions by domestic authorities.⁸ While the FPC is housed within the Bank of England, and its primary responsibility is the systemic health of the British financial system, it is also specifically tasked with "supporting the economic policy of the government".⁹ The Chancellor of the Exchequer writes a letter of remit¹⁰ annually to the FPC, outlining its responsibilities, and the committee must reply. It is worth noting that, in these replies, the Governor of the Bank of England often explicitly makes the point that the FPC must balance costs and benefits of prudential action. In 2015, for example, the Governor's response to the Chancellor's letter of remit included the following paragraph: "The Committee recognises that action to increase resilience may in some circumstances have a short-term effect on growth, even when that action will make a positive contribution to growth in the medium and longer term. In such circumstances, it will manage and communicate its approach transparently and consistently, having regard to proportionality and, where appropriate and practicable, the costs and benefits of its actions in the context of its primary and secondary objectives."¹¹

In response to a concern about whether finance would support productive investment, particularly in infrastructure, the Governor wrote in 2016: "The Committee will continue to consider the capacity of the financial sector to supply finance for productive investment when judging whether its actions could have a significant adverse effect on the capacity of the financial sector to contribute to the growth of the UK economy in the medium or long term."¹²

It should be clear, therefore, that macro-prudential regulation (as well as the laws enabling such regulation) in most economies is designed by a wide set of stakeholders, including those responsible for ensuring growth and investment; and its key variables in many economies, including various capital adequacy requirements, are set by officials who are accountable directly or indirectly for targets beyond just the reduction of systemic risk.

The answer thus to the question posed above is: No. No, the Basel committee, and the various drafting sub-groups, have neither a structure nor incentives analogous to domestic drafters of similar regulation. The central bankers and financial regulators represented in the committee are not balanced by members of other branches of their domestic states. Nor are there other members of the committee who could balance out, through differing responsibilities, the incentives specific to central banks and financial regulators. (The European Commission is the sole such member.)

What are the incentives of the BCBS members?

It might however be argued, given central bankers in their roles as macro-prudential regulators domestically are often in a position to balance out various needs, that they will fairly represent these same needs within the Basel framework. This assumption, however, does not entirely stand up to a closer look at the nature of the disagreements and interventions in the Basel negotiations.

It is certainly true that there have been significant disagreements within the Basel committee over aspects of Basel-III, and that these disagreements are born out of the domestic mandates of the various central banks involved. However, a study of these disputes indicates that the aspect of the mandates of the central banks that motivated them in these cases is almost invariably (a) the health and (b) the competitiveness of their domestic banks. To a smaller extent, they have demonstrated concern for the pipeline of productive investment – but specifically as it relates to small and medium enterprises.

The positions of specific countries' representatives on the Basel committee when it comes to capital requirements imposed by the new norms are closely related to their banks' positions immediately following the crisis of 2008. Intriguingly, the Anglo-American position was for higher capital requirements, as opposed to the European position – perhaps unexpected, given their differing ideological assumptions about finance in general, as well as their negotiating positions during Basel-II.

Lucius Quaglia points out that the City of London had many large, internationally active, and rapidly re-capitalised banks after the crisis. The priority for British negotiators was thus to ensure that capital requirements were set high enough to ensure stability. They also favoured a quick transition period, given their comfortable position. This would ensure their competitive advantage with respect to European banks. They were also concerned with competition with banks in America and China that they feared (perhaps incorrectly in retrospect) would have weaker capital requirements.¹³

However, as Quaglia and David Howarth argue, Continental banks, particularly in France and Germany were in contrast under-capitalised. They had less equity financing, and in France and Spain the largest banks had subsidiary insurance companies. Thus they would resist not just higher capital requirements, but also wish to permit counting the capital of these insurance subsidiaries over and above

the capital of their controlling banks. European regulators pointed out that their banks' safer asset portfolio – mortgages and loans to companies – meant they should have lower risk weights than a standardised approach would provide.¹⁴

This disagreement long delayed the finalisation of Basel-III (leading some to declare that the revised framework would in fact be a Basel-IV). Many of the original Basel-III requirements were diluted in their implementation by national regulators, depending on their particular preferences.¹⁵ The original draft of the CRD-IV by the European Commission, meant to implement the Basel-III norms, is particularly revealing. It made the definition of capital less strict (because of the ownership of insurance, mentioned above); reduced the power of the “leverage ratio” by defining it as Tier I capital over assets, instead of equity capital over assets (again because of the difference in capital-raising specified above); and, indeed, imposed what Jakob Vestergaard and Maria Retana call a Europe-wide “ceiling” on capital ratios (This requirement was later removed).¹⁶

The capital requirements eventually agreed on (as part of ‘Basel-IV’) were favourable to European banks; in particular, their regulators won for them lower risk weights for standardised models, giving more priority to their internal models of risk than expected.¹⁷ After the final numbers for capital requirements and risk weights were announced in December 2017, European bank shares rose in response.¹⁸ The purpose of this discussion was to demonstrate that national regulators, in their discussion and implementation of Basel-III in both its original and updated frameworks, kept the competitiveness and internal stability of their “own” banks. The Basel negotiators were interested in the prosperity of banks, and not of borrowers.

An exception: SMEs?

This is not to say that considerations about productivity of lending were completely ignored. In fact, some members of the Basel council have apparently reflected concerns of outside observers regarding the effect of Basel-III requirements on lending to small and medium enterprises. The European implementation of Basel-III specifically included a “supporting factor” for SMEs that was in fact introduced in 2014, well in advance of the full phase-in between 2016 and 2019.¹⁹ Even the overall effect of Basel-III negotiations on lending to SMEs was defended in January 2018 by Sabine Lautenschläger of the European Central Bank thus: “At global level, the bottom-up reforms see small increases in capital for exposures to other banks, large corporates and equity investments. This is somewhat offset by a reduction in risk weights for loans to small and medium-sized enterprises.”²⁰

Yet it would be hasty to suggest that concerns over SME lending, even when raised at Basel, are a genuine reflection of broader concerns about growth and productivity. It is far more likely that they emerge from the same source as other negotiating principles: as a reflection of the priorities set by particular banking systems. In particular, the German banking system features long-term relationships between medium-sized national banks and the small and medium enterprises that are so famously the foundation of that country's prosperity.²¹ To the extent that SME lending concerns were raised at the level of Basel, it was because certain banking

systems required it, and not because of the overall effect on growth, investment and prosperity.

Who is responsible for project finance?

As suggested in the Introduction, one major consequence of these skewed incentives for the Basel Committee on Banking Supervision was that lending to longer-tenor projects has slowed down considerably. One expert quoted in the *International Financial Law Review* said: “My sense is that the new leverage ratio and liquidity standards of Basel-III had the most impact on the project finance market.”²² In particular, the net stable funding ratio (NSFR) requirement under Basel-III, which mandates that banks hold a certain amount of stable capital with liquidity equivalent to their assets, dis-incentivises banks from financing projects of longer tenure as such stable capital is typically expensive. International project finance backed by export credit agencies (ECAs) is particularly affected; in the developed world, ECAs may not directly lend, but usually act to provide cover for banks that do the actual intermediation. The net effect of the NSFR requirement is to create silos: any lending with for over 12 months must be financed out of capital or out of borrowing with an equivalent tenor. Maturity transformation becomes extremely expensive.

A drought in international project finance as a major consequence of Basel-III for the developing world – greatly hurting attempts to build infrastructure, including climate-sensitive infrastructure, in the global south – should have been an important issue for developing-world representatives on the Basel committee. Yet this appears to not have been a major issue for the central bankers from these geographies.

Officials of the Reserve Bank of India, for example, have rarely commented on this issue. Aside from the natural focus on the health of the banking system, the main secondary focus of RBI attention with respect to Basel seems to have been instead, as with their developed-world counterparts, the competitiveness of the banks. In defence of the implementation of Basel-III, former Governor D Subbarao used as his primary argument a fear that “the ‘perception’ of a lower standard regulatory regime will put Indian banks at a disadvantage in global competition”.²³

Even when the RBI has discussed the question of project finance, they have largely been dismissive, or focused purely on the effect of the new norms on domestic banks’ funding of infrastructure rather than on cross-border flows. Harun Khan, Deputy Governor of the RBI, said in 2015, was dismissive of the effective ban on maturity transformation: “As infrastructure lending is typically of maturity much higher than one year, there may not be any impact on such lending due to future implementation of NSFR requirements. Therefore, the NSFR requirements will thus be neutral to all loans having residual maturity of one year or more.... what is clear is that Basel-III regulations do not impact lending to any specific sector including that of infrastructure financing by banks in a negative manner.”²⁴

Even those officials who at least accepted there was a trade-off were, in the end,

guilty of misdiagnosis. Governor D Subbarao laid out the question thus: “We are going to have to impose higher capital requirements on banks as per Basel-III at a time when credit demand is going to expand rapidly. A crucial question is this. Will this raise the cost of credit and hence militate against growth? Put differently, how much growth are we willing to sacrifice in order to buy insurance against financial instability?²⁵” Yet Subbarao then framed this as a conflict between “short-term” and “long-term” growth, with Basel-III guaranteeing “long-term” growth – whereas, of course, a Basel-induced constriction in international finance of infrastructure will have a disproportionate and negative effect on long-term growth prospects.

These statements illustrate a fact worth noting: that, throughout, the public communication of RBI officials has focused on Basel-III’s effect on domestic banks, and to a far lesser effect on domestic lending. The question of international flows has not featured. It would be easy to see this as dereliction of duty. Yet, equivalently, it reflects the problematic structure of the Basel Committee. Developing-world central banks like the RBI, even if they are committed to support growth, are accustomed to thinking of supporting growth through domestic financing. Individual regulators and central banks were confident that, since the implementation of Basel-III in their jurisdiction was in their own hands, they would be able to ameliorate any negative effects of the new norms on domestic lending through regulatory action or forbearance – such as the RBI’s “5/25” scheme, being discussed at the same time as Basel-III implementation²⁶. *This underlines the fact that no member of the BCBS saw it as its direct responsibility to keep long-term financing flowing across borders, even those from the countries most directly affected.*

What larger political economy is Basel embedded in?

The BCBS, with its skewed incentives, may have been the primary mover in the framing of the Basel-III (and ‘Basel-IV’) norms. Yet there were other powerful stakeholders in the mix, whose action, or inaction, needs to be scrutinised if the full political economy of Basel-III is to be understood. Primary among these is the G-20. In fact, the original Basel-III norms were endorsed in 2010 by the G-20 leaders at their summit in Seoul, and the BCBS sends regular reporting updates to the G-20 leadership²⁷.

The priorities of the G-20 after the financial crisis of 2008 – a period in which the grouping came into its own and became, in many senses, the primary forum for global governance – take on significance here. It is important to recognise that the G-20 saw the BCBS, alongside the Financial Stability Board and the international accounting standards agencies, as important tools for reform of international finance. While it could be argued that these bodies are, by their nature and because of their composition, unlikely to be able to take a holistic view of the reforms they recommend, the same cannot be said of the G-20. Perhaps it is fair to see the relationship between the BCBS and the G-20, for example, as that between a quasi-independent domestic regulator and the executive. We have seen earlier how this relationship can play out domestically.

Yet the priorities of the G-20 when it came to international financial reform in the

years after the crisis do not seem to have included the protection of international long-term capital flows. From 2010 to 2014, for example, much of the G-20's interaction with the FSB and the BCBS focused on regulation of “shadow banking” and the global hedge fund sector. This is understandable from a political standpoint – although hedge funds are not generally held to be primarily responsible for the 2008 crisis, they were a common target for political rhetoric at the time, and believed to be behind the build-up of excessive risk-taking prior to 2008. In this action, therefore, the G-20 was responding to its leaders' domestic political imperatives.

Another priority for the G-20, similarly determined by the political economy of the post-crisis years, was the attack on tax havens. The underlying belief was that sovereigns had saved the world economy after large institutions tried to destroy it; and thus sovereign revenue must be protected from the irresponsibility of large institutions and trans-national entities. The London Summit of 2009 helped create the Global Forum on Tax Transparency, which Angel Gurría of the OECD described as “the most effective peer review process in the world”. Certainly, transparency has increased in the years since 2008, though it is too soon to proclaim the fight on tax havens won. What is important to note is that, again, the priorities of the G-20 are clear – and preserving the free movement of capital is not among them.

In one respect, however, the early actions of the G-20 were focused on preserving such flows. Owing to a strong intervention from leaders of the developing world, including India's, at the Seoul Summit in November 2010 the G-20 said it would “monitor and assess trade finance programs in support of developing countries, in particular their coverage and impact on LICs (i.e. Low Income Countries), and to evaluate the impact of regulatory regimes on trade finance”.²⁸ As a consequence, the BCBS in December 2010 agreed to “evaluate the impact of the regulatory regime on trade finance in the context of low income countries” and set up a Trade Finance Group to do so.²⁹ This is likely because of specific aspects of the original Basel-III recommendations, including the treatment of off-balance sheet letters of credit – a vital aspect of trade finance to emerging economies.³⁰ They did not fit into the general Basel structure of how risk was evaluated, which focused on the counterparty in a transaction, rather than on the performance of the asset class. Trade finance – self-liquidating, well collateralised – was clearly an exception. As a consequence, the treatment of letters of credit was swiftly reformed. The G-20's clear emphasis on preserving trade finance flows in the initial years after the crisis – it was feared that export credit would freeze up, with a disastrous effect for global trade and any chances of a worldwide recovery from the crisis – meant that, for example, from 2009 to 2013 US cross-border trade finance to emerging markets and developing economies increased from about \$20 billion to almost \$60 billion, as pointed out by Liliana Rojas-Suarez and Danial Muhammad of CGDev.³¹

Since then there has been a precipitous decline in trade finance, partly as a consequence of outstanding issues under the Basel-III framework.³² This too is, perhaps, revealing of how the G-20 could shape the agenda: there is a decreased political focus on maintaining trade links in a newly protectionist era, which means the BCBS could perhaps take its eye off the ball and pay less attention to the

pleading of traders.

These three examples demonstrate the degree to which political preferences at the G-20 level have shaped the nature of trans-national macro-prudential regulation. Missing in all this is a commitment to keeping long-term flows secure. While other organisations responsible for constructing and evaluating these trade-offs are structured so as to introduce systemic bias into the decision, the same cannot be said for the G-20. This is, in the end, where the balancing should be taking place—of priorities, of winners and losers, and of the various probabilities of success and failure. *The political economy of Basel is subordinate to the political economy of the G-20.* At the Buenos Aires summit in November of 2018, it was therefore unfortunate that the leaders of the G-20 did not pay sufficient attention to criticisms of the final Basel recommendations of December 2017, and in particular to their tendency to throttle cross-border infrastructure finance.

Unanswered questions

Any policy decision has behind it a series of actors with specific incentives; and any policy decision creates a set of winners and losers. Properly organised decision-making systems ensure that the incentives of those in the institutions that make policy decisions are reasonably aligned with the effects their decisions will have – in other words, that the concerns of both winners and losers are fairly represented. The political economy of the Basel norm-setting process is such that some concerns are prioritised over others.

Technical macro-economic or regulatory processes – whether it be extraordinary monetary policy, or currency management, or macro-prudential regulation – is no different from any other form of economic policy. Costs and benefits have to be balanced. It might be possible to argue, as D Subbarao has, that the benefits from a smaller likelihood of a crisis hitting internationally significant banks outweigh the costs. But this decision must be made with a clear eye on what the costs are. It will also be necessary, for any policy decision to be truly welfare-enhancing, to compensate the “losers”. In this case, the costs of Basel-III are not spread out across all those who benefit. In particular, as Gonzalo Gasos of the European Banking Federation argues, “the cost is allocated asymmetrically between businesses. Certain portfolios that are critical for the economy like trade finance, SME lending and long-term project finance, are hit by every regulation: capital, leverage, and especially, funding.³³” This fact is a direct consequence of the structure of the Basel deliberations and of the larger political economy considerations that birthed it.

Endnotes

- 1 "Basel Committee Membership." The Bank for International Settlements. June 10, 2013. <https://www.bis.org/bcbs/membership.htm?m=3|14|573|71>.
- 2 "Report of the Financial Sector Legislative Reforms Commission." Department of Economic Affairs. March 2013. https://dea.gov.in/sites/default/files/fslrc_report_vol1_1.pdf.
- 3 "RBI Chief to Head FSDC Sub-panel." The Hindu. October 12, 2010. <https://www.thehindu.com/business/Industry/RBI-chief-to-head-FSDC-sub-panel/article15777950.ece>.
- 4 "Macroprudential Frameworks, Implementation, and Relationship with Other Policies." Reserve Bank of India. Bank for International Settlements. <https://www.bis.org/publ/bppdf/bispap94m.pdf>.
- 5 Haltom, Renee, and John A. Weinberg. Does the Fed Have a Financial Stability Mandate? Issue brief no. EB17-06. June 2017. https://www.richmondfed.org/-/media/richmondfedorg/publications/research/economic_brief/2017/pdf/eb_17-06.pdf.
- 6 "Testimony by Chair Yellen on Supervision and Regulation." The Fed - Money Stock and Debt Measures. September 28, 2016. <https://www.federalreserve.gov/newsevents/testimony/yellen20160928a.htm>.
- 7 "Congressional Control over the Banking Agencies' Budgets." Federal Reserve Bank of Atlanta. July 2017. <https://www.frbatlanta.org/cenfis/publications/notesfromthetvault/07-congressional-control-over-the-banking-agencies-budgets-2017-07-31>.
- 8 Kohn, Donald. "Institutions for Macroprudential Regulation: The UK and the U.S." Brookings. April 17, 2014. <https://www.brookings.edu/on-the-record/institutions-for-macroprudential-regulation-the-uk-and-the-u-s/>.
- 9 "Financial Stability." Bank of England. <https://www.bankofengland.co.uk/financial-stability>.
- 10 "Remit for the Financial Policy Committee - 2017." Bank of England. March 8, 2017. <https://www.bankofengland.co.uk/letter/2017/remit-for-the-fpc-2017>.
- 11 "Remit Letter from the Governor to the Chancellor." Bank of England. August 11, 2015. <https://www.bankofengland.co.uk/-/media/boe/files/letter/2015/governor-letter-110815>.
- 12 "FPC Response to March 2016 Remit and Recommendations Letter." Bank of England. May 26, 2016. <https://www.bankofengland.co.uk/-/media/boe/files/letter/2016/governor-letter-260516>.
- 13 Quaglia, Lucia. "The 'Old' and 'New' Politics of Financial Services Regulation in the European Union." March 06, 2012. <https://www.tandfonline.com/doi/abs/10.1080/13563467.2012.622360>.
- 14 Howarth, David, and Lucia Quaglia. "Banking on Stability: The Political Economy of New Capital Requirements in the European Union." 2013. [https://orblu.uni.lu/bitstream/10993/4555/3/Howarth and Quaglia for JEI author postprint.pdf](https://orblu.uni.lu/bitstream/10993/4555/3/Howarth%20and%20Quaglia%20for%20JEI%20author%20postprint.pdf).
- 15 Veron, Nicolas. "The European Union Lags on Basel III Banking Reforms." PIIIE. December 10, 2014. <https://piie.com/blogs/realtime-economic-issues-watch/european-union-lags-basel-iii-banking-reforms>.
- 16 Vestergaard, Jakob, and Maria Retana. "At the Brink of Insolvency." DIIS. <https://www.diis.dk/en/research/the-brink-of-insolvency>.
- 17 "Basel 3, an International Capital-adequacy Standard, Is Unloved but Much Needed." The Economist. May 04, 2017. <https://www.economist.com/special-report/2017/05/04/basel-3-an-international-capital-adequacy-standard-is-unloved-but-much-needed>.
- 18 "Financial Times European Bank Shares Rise on 'relief' over Basel Rules." Financial Times. <https://www.ft.com/content/16d3ff96-d4a2-3956-a1d0-df9fd3fd2adc>.
- 19 "Eba Report on SMES and SME Supporting Factor." March 23, 2016. [https://www.eba.europa.eu/documents/10180/1359456/EBA-Op-2016-04 Report on SMEs and SME supporting factor.pdf](https://www.eba.europa.eu/documents/10180/1359456/EBA-Op-2016-04%20Report%20on%20SMEs%20and%20SME%20supporting%20factor.pdf).
- 20 Lautenschläger, Sabine. "Sabine Lautenschläger: Basel III - Sense and Sensitivity." The Bank for International Settlements. January 30, 2018. <https://www.bis.org/review/r180130a.html>.
- 21 Angelkort, Asmus, and Alexander Stuwe. "Basel III and SME Financing." Www.managerkreis.de. 2011. <http://library.fes.de/pdf-files/managerkreis/08528.pdf>.
- 22 Lee, Ashley. "How Basel III Impacts ECA-backed Project Finance." July 4, 2014. <http://www.iflr.com/Article/3358235/How-Basel-III-impacts-ECA-backed-project-finance.html>.
- 23 Vishwanathan, N. S. "Basel III Implementation- Challenges for Indian Banking System." Rbidocs.rbi.org.in. August 31, 2015. <https://rbidocs.rbi.org.in/rdocs/Speeches/PDFs/BIBEEA5F83112F4DF18D88993A41E69179.PDF>.
- 24 "Reserve Bank of India - Press Releases." Reserve Bank of India - Function Wise Monetary. https://www.rbi.org.in/scripts/FS_Speeches.aspx?id=968&fn=6.
- 25 Subbarao, Duvvuri. "Basel III in International and Indian Contexts Ten Questions We Should Know the Answers For." www.rbi.org.in. September 4, 2012. https://www.rbi.org.in/SCRIPTS/BS_SpeechesView.aspx?id=725.

- 26 Rajan, Raghuram. "Raghuram Rajan: Issues in Banking Today." The Bank for International Settlements. February 11, 2016. <https://www.bis.org/review/r160216h.htm>.
- 27 "The G20 Seoul Summit Leaders' Declaration." Www.treasury.gov. November 12, 2010. https://www.treasury.gov/resource-center/international/Documents/1_FINAL_SEOUL_COMMUNIQUE.pdf.
- 28 "Treatment of Trade Finance under the Basel Capital Framework." www.bis.org. October 2011. <https://www.bis.org/publ/bcbs205.pdf>.
- 29 ibid
- 30 Cornford, Andrew. "Trade Finance: Effects of the Basel Capital Framework and Other Regulatory Developments." April 2017. http://www.networkideas.org/wp-content/uploads/2017/09/Trade_Finance.pdf.
- 31 Rojas-Suarez, Liliana. "Basel III & Unintended Consequences for Emerging Markets and Developing Economies - Part 1: Cross-border Spillover Effects." Center For Global Development. May 14, 2018. <https://www.cgdev.org/blog/basel-iii-unintended-consequences-emerging-markets-and-developing-economies-part-1-cross-border>.
- 32 ibid
- 33 Gasos, Gonzalo. ""NSFR Bitter Pill to Swallow, Needs Recalibration." Www.ebf.eu. September 19, 2017. <https://www.ebf.eu/wp-content/uploads/2017/09/NSFR-bitter-pill-to-swallow.-GG-speech.pdf>.

PPP Model, Regulatory Oversight and Private Financing: Evolutionary Trinity of India's Infrastructure

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Introduction

The evolution of India's infrastructure policy over seven decades since Independence, can be broadly divided into three phases. Each policy framework has been celebrated as a panacea for all the ills that plague the country's infrastructure systems—from bad roads and inadequate electricity, to abysmal sanitation and poor telecommunications services. Yet, India's infrastructure story often reads like a badly written novel: its textures are constantly changing, not merely through sector-specific policies but across its overarching philosophy. This essay examines the country's infrastructure policies with a disinterested but 20-20 vision across 70 years of Independent India. It demonstrates how the aspirations of the people—within the confines of weak public finances, voiced in a democracy, and delivered through competitive politics—have evolved across three broad trends.

First, the shift to a public-private participation (PPP) model from one where the government and the public sector had the monopoly over the key sectors of the Indian economy. Less to do with economics and more with politics, the old, government-driven framework was based on Russian revolutionary, V.I. Lenin's "commanding heights" 1922 speech¹ and adopted for India. Although there are several definitions of PPP, this article uses that from the World Bank:² "A long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility and remuneration is linked to performance." The Bhakra Nangal dam,

for instance, on the border of Punjab and Himachal Pradesh in the north of India, was built entirely by public resources. It was conceptualised in 1944, cleared in 1945, and constructed in 1948; the first phase was completed in 1963.³ The Indira Gandhi International Airport, on the other hand, was built by GMR, a private corporation, through a January 2006 agreement⁴ to operate, manage and develop the airport for 30 years (that can be extended by another 30). Both are large projects having huge capital and technological requirements, with high level of management post-completion. The dam was built entirely by the State, and the airport by a private entity, under the PPP route.

Second, the shift to regulatory bodies with the government ceding partial control. This was a big leap: from having the government micromanaging the infrastructure project down to the last nail, to outsourcing some of the functions to a relatively independent regulatory body which drafts the rules and ensures delivery. In general, a regulator has quasi-judicial powers, and acts on behalf of the government to deliver policy objectives using market forces, where private and public sector companies compete. The regulator oversees consumer interest (banking,⁵ insurance,⁶ securities,⁷ pensions,⁸ telecommunications⁹), or extraction of natural resources (oil and gas¹⁰); and ensures competition.¹¹ Such a structure brings transparency into the sector, and enforces the rule of law under the supervision of appellate bodies such as the Securities Appellate Tribunal¹² for securities, insurance and pensions, or the National Company Law Appellate Tribunal¹³ for the Competition Commission. To illustrate, the Telecom Regulatory Authority of India has ushered in a telecommunications revolution by systematically working towards catalysing competition and ensuring the world's lowest tariffs. Indeed, while the public may today take for granted the leadership of the private sector in telecom delivery, it has in fact been a long journey—from the humble landline telephone being treated as a luxury good, to the mobile phone of today that has reached the poor. On the policy side, this is an evolution from the earlier times when the state had a monopoly over the sector, first directly through the Department of Telecommunications, then through its two companies, Bharat Sanchar Nigam Ltd and Mahanagar Telephone Nigam Ltd, and finally to a point where the private sector has taken the lead.

And third, the move from government/public financing to private sector or mixed financing. In this framework, the government shifts the burden of financial requirements on the private entrepreneur, and ensures that its public objectives are met, while the entrepreneurs balance public outcomes with shareholder returns. Even as 'profit' may have already earned negative connotations following independent India's socialist beginnings, it remains a necessary condition for banks, insurance and pension funds that make investments in such long-term projects. The implied sovereign guarantee in these projects reduces their interest costs; but in case the project faces an obstacle—land acquisition for instance—the accompanying risk becomes greater than merely financial. The issue then attains a political hue in the form of corruption and delays, loss of systemic governance credibility, and waste of capital resources. The risks that entrepreneurs face in the market—financial, strategic, political, technological and legal—hurt not only their companies and the sectors but leave public policy objectives unmet. The recent

past has seen such incidents in coal mining¹⁴ and telecommunications.¹⁵

Hurdles in Infrastructure Delivery

India's infrastructure policy often appears chaotic on the outside, tentative in its expression and experimental on hindsight. The chaos can be blamed not only on the unpredictability of execution, but the innumerable allegations of wrongdoing that have plagued every sub-sector of infrastructure—from roads and airports, to ports and telecommunications—leading to long periods of litigation. The policy appears tentative because under the huge requirements—technical, financial, legal and operational—the new models of state control acquire only superficial change, not in their spirit that are bound by old habits, leaving investor unsure. And it gives the impression of being experimental because of serial failures and changes in stances, as governments abandon absolute control. For all the planning undertaken and infrastructure built over the first four decades since Independence, the first reference of infrastructure as a strategic policy priority came as late as July 1992, in the 8th Five Year Plan.¹⁶ Since then, its importance has grown and its expression articulated through the three evolutions.

This trinity finds resonance across almost all infrastructure sectors. In telecommunications, for example, the shift to auctioning of spectrum¹⁷ from the earlier first-come-first-served¹⁸ policy caused the sector to land at the doorstep of the Supreme Court, pushed some companies into oblivion, and sent the Minister of Telecommunications D. Raja to jail.¹⁹ In a way, India's infrastructure policy mirrors the country's overall political economy. Despite institutional structures, the administrative and political mindsets and actions have not kept pace with a more market-friendly regime—it is this gap in the last mile of policy evolution that is holding back the growth of India's infrastructure. For instance, it is futile to expect the private sector to behave like the public sector in its operations and be bound by the same matrices that oversee the public sector—in the private space the market (through investors) does that. The government's role should be to ensure that the public policy objectives translate into outcomes in a transparent manner, with full competition between economic agents, whether public, private or PPP. Micromanaging beyond that is counterproductive.

Once the policy foundations are clear, new hurdles come up in the form of on-ground delivery. The governance oversight over infrastructure has matched the complexity of managing such large projects, from designing policy, opening tenders and signing agreements on the government's side, and conceptualising the project, executing it and ensuring public policy outcomes on the part of entrepreneurs. At every stage, obstacles are raised by a suspicious state, backed by other agents of democracy, such as the opposition parties and activists on one side and business competition on the other. Being government-controlled, the entire process, from policy to outcomes, lies in the realm of public debating, political wrangling and retrospective blame-mongering.

The government makes a decision to create infrastructure and begins to draft the enabling policies. Next follows the awarding of contracts to private entrepreneurs.

The project begins and faces unexpected hurdles, such as in land acquisition. At each and every stage of the process, there is a likelihood of accounting and other issues being raised. An entire sub-sector of professionals, proficient in law, audit and finance, have come up to support entrepreneurs and governments alike. But such is the political economy of infrastructure development that what should have been a simple contract to create policy outcomes for the people has deteriorated into an instrument where the private sector is being tied down to delivering what the public sector could not, using the same failed tools of public sector restrictions. Add the “burden of democracy” in the form of public checks and balances such as the Parliament, the judiciary, the political actors capturing the voices of diverse constituencies, the media, and the activists—and the hurdles standing before infrastructure projects rise higher.

Given the scale and immensity of operations, the system cannot decouple politics (in its broader term, and not merely party power plays) from infrastructure economics. The reasons for policy failure need not be intentional—it could simply be financial, that is, the inability of governments to make good on their promises. Seventeen years ago, Enron’s infamous Dabhol Power Project fell victim to the trend of what is called the government “buyer’s remorse.”²⁰ In 2001, when the Maharashtra government started to default on payments for Dabhol—and, in due course, both the state and the central governments breached their respective offtake guarantees—the company ceased operations, turning the largest independent power project in emerging markets into one of its largest financial and legal messes.²¹ Irrespective of what Enron did in the US, its exit from India scarred the latter’s reputation among sovereigns and global financial and infrastructure firms alike, and “will not help either’s [the Centre’s or the Maharashtra government’s] long-term reputation and could complicate efforts to attract large foreign investors in the future.”²²

Solutions to fixing such risks are not easy but various attempts are being made, such as the purchase of political risk insurance covering the capital structure. Another solution is seeking the participation of influential banks from different countries (particularly major trading partners or creditors of the host country), regional development banks, or the World Bank,²³ to help diversify both risks and subsequent pressures. The nature of the business is such that governments have assumed risks that investors should bear. This is because the investors have been understandably wary of taking them on and governments have been able to offer guarantees without incurring any immediate cash costs. On their part, governments can take two steps to improve the environment for risk allocation. First, they can reduce the extent of the risks investors face by pursuing stable macroeconomic policies, disclosing information, implementing good laws and regulations, and liberalising financial markets. And second, improve the way they measure, budget, and account for the guarantees they give, so that the costs and risks are clear at the time the guarantees are issued and not only when the government must subsequently pay up.²⁴

On the other side of the negotiation table are private developers and financiers, with a different approach. Concessions were sometimes privately negotiated, and often publicly auctioned. Opportunities were aggressively pursued by a myriad of

new power and telecommunication development companies in prospective host countries as diverse as Brazil, Egypt, Honduras, and Vietnam. Asia was a hotbed of projects, with aggressive development programmes in India, Indonesia, Pakistan, and the Philippines. South America also had major projects up for bid across the continent.²⁵ The private development of public infrastructure offered a means to tap state-of-the-art technologies, and to do so without further burdening public coffers, which was an apparent win-win for all parties— governments, companies and the people. Thus, the stage was set in the early 1990s for an upsurge in worldwide demand for private-sector developers and operators of erstwhile public services.²⁶

India joined the PPP bandwagon as it ushered in economic reforms in 1991. Since then, of the 9,269 infrastructure projects awarded through the three modes of traditional government procurement system, private infrastructure, and PPPs, less than one-fifth or 1,731 projects have been granted through the PPP route. Although the number of PPPs have been small, they have built above their size: out of a total INR 65.2 trillion worth of projects, almost two-fifths have been through the PPP route.²⁷ Barring fluctuations, the growth of these projects have generally been on an upward trajectory. From just one project worth INR 16 billion in 1991-92, the number rose to 158 with a value of INR 12.6 trillion in 20 years to 2010-11—or a compounded annual growth rate of 17.3 percent in number of projects and 13.4 percent in value. In the last two financial years, this growth has tapered off, falling to 88 projects worth INR 545 billion in 2016-17 and just seven projects worth INR 42 billion the next year. The other visible trend is that the ticket size of these projects has been falling, too—from an average project size of INR 8.2 billion in the first decade (1991-92 to 2000-01), it rose to INR 9.1 billion in the second decade, before falling to INR 5.0 billion in the seven years from 2011-12 to 2017-18. Coincidentally, this is also the period when political risk perception for entrepreneurs rose, particularly in three key infrastructure sectors of telecommunications, oil and gas, and mining. This fall can be seen as a self-adjusting market mechanism to the unexpected outcomes of India's political economy.

The high political risk in India's infrastructure projects is as much due to their structuring as it is to history. Because most infrastructure—railways, canals or bridges, for instance—had been created and maintained by the government directly through its ministries, departments or public-sector companies in the first four decades, an entrenched system of checks and balances has been hardcoded into all projects. This system remains. As a result, the pace of infrastructure creation is slower than that of, say, China's. Infrastructure that has been outsourced to the private sector—airports or telecommunications, for instance—is created through a process of auctioning and regulation. Historically, India's infrastructure has been led by the public sector with rules, regulations and processes in sourcing, contracting, and operating. Handing over a project to the private sector but using the same principles cuts out a vital 'P' in 'PPP': the private sector flexibility. Finally, depending on the nature of contracts or agreements, awarding or financing them through public-sector banks and financial institutions give rise to more obstacles in the financial execution.

For instance, a national highway is a public good: no one can be prevented from using it (i.e., it is non-excludable) and one person using it does not diminish the good for others (i.e., it is non-rival); therefore, it is the public that is answerable for its financing, operation, maintenance and tolls. Now that the “commanding heights” model of development—where only the state can undertake large projects—has been replaced by PPPs or contracts with private entrepreneurs to create and maintain infrastructure, managing public scrutiny of private projects has become a raging debate. The controversy—naturally appended to it as an unintended consequence—has to do with the question of why a private company should make money from creating a public good. There has been no convincing answer to this rhetoric so far. The question is wrongly framed, however, as the real issue is not the processes being followed by the private sector but rather to what degree have the government’s public policy objectives been met through the infrastructure built by the private sector. A change of focus to delivering outcomes may go farther than controlling process inputs.

Evolution of India’s Infrastructure Policy

From the point of view of definition of infrastructure, policies have been segregated and siloed across sectors. The Indian government has broken down the term ‘infrastructure’ into five categories: transport and logistics; energy; water and sanitation; communications; and social and commercial infrastructure. Under these five categories are 34 sub-sectors including railways, electricity generation, irrigation, telecommunication services, and hospitals.²⁸ Each of these categories, and often the sub-sectors under them, have had their unique evolutionary trajectories towards the same goal of attracting private and foreign capital into building India’s infrastructure. The case of mining or electricity, for instance, has taken a different journey from that of telecommunications or airports. Compounding the matter are the varied limits to allowing foreign capital into these sectors and sub-sectors. This is where gradualism is seen in place—from a position where all infrastructure was under the purview of the government and its agencies, to a bigger role for the Indian private sector, and eventually then to opening up foreign direct investment (FDI).

There is flawed logic in the way FDI has been allowed into infrastructure. Reeling under the pressure of the country’s early socialist ambitions and strategic importance, the business of atomic energy or arms and ammunition was placed under Schedule A of the Industrial Policy Resolution²⁹ of 1956, a group of 17 industries, whose “future development” was the exclusive domain of the State.³⁰ “All new units in these industries, save where their establishment in the private sector has already been approved, will be sent only by the State,” the 30 April 1956 resolution stated. Here too, a hierarchy was created, under which railways and air transport, arms and ammunition, and atomic energy would be developed as monopolies of the central government.

There is no logic, either, to how the different classes of infrastructure have been opened to private investment. This limits the transformative power of infrastructure, of which telecommunications is a prime example. The way infrastructure has been

classified has been incoherent. For instance, road transport and sea transport were placed under Schedule B, under which both the state as well as Indian private enterprise would be given the “opportunity to develop” the sectors. Why the railways was kept as a central government monopoly while roadways was opened to private enterprise, is a question that has no answer, if it was even asked. Other than a clear case of politics influencing economic policy articulated through the powerful Railway unions, and the potential to create jobs and stations, there is no reason for this divergence. Dams that are a public good with very high capital intensity—and thereby a natural preserve of the state’s infrastructure creation—were not mentioned at all. Nor were oil and gas, though coal and lignite were placed under Schedule A, as were generation and distribution of electricity, and telephones and telephone cables, telegraph and wireless apparatus.

As the country was newly freed from imperialism, India’s leadership—with little state capacity to understand the complexities and the benefits of markets—adopted the easier policy of command and control in matters of the economy. Effectively, the policy created an ecosystem of state-owned and state-controlled businesses run by an entitled, exchequer-financed workforce that delivered only shortages and inefficiencies. It also exported opportunities of output and jobs across industries to other nations—defence to Russia, Israel and France; ship-building to South Korea and Japan; and mining to Australia and the US. In the area of defence, India’s leaders were ready to import weapons manufactured by foreign private companies but Indian private companies continued to be viewed with suspicion. As a result, India has little to showcase by way of a world-class infrastructure. One bright exception is the stellar performance of the public-sector Indian Space Research Organisation, which has been launching satellites for other countries³¹ regularly: between 1999 and 2018, ISRO launched 237 satellites for various countries including the US, Germany, South Korea and Singapore.

What made matters worse was that several large industries that were not initially placed under Schedule A or B restrictions, were taken from the purview of private entrepreneurs and “nationalised”. The first four decades post-independence viewed control and nationalisation as the most effective tools to deliver better infrastructure. It applied not merely to companies but to entire sectors, with objectives that were opaque at best, and served personal interests at worst. For instance, nine functioning airlines were nationalised into two government-managed entities. Under the Air Corporations Act of 1953,³² Parliament voted to nationalise nine airlines—Air India Ltd, Air Services of India Ltd, Airways (India) Ltd, Bharat Airways Ltd, Deccan Airways Ltd, Himalayan Aviation Ltd, Indian National Airways Ltd, Kalinga Airlines, and the Air India International Ltd—and replaced them with Indian Airlines and Air India International. The function of the corporations included providing safe, efficient, adequate, economical and properly coordinated air transport services, whether internal or international or both. Overnight, the business of running airlines by private citizens was made illegal, with punishments ranging from a minimum fine of INR 1,000 to a maximum imprisonment for three months, or both, for every flight. The civil aviation industry suffered, as a result, setting India back by decades.³³

Apart from destroying a sector that has a multiplier effect on the economy, this single law paved the path forward for the government's approach to the private sector and consolidated nationalisation as an economic strategy for several other sectors. It nationalised 154 Indian, 16 foreign insurers and 75 provident societies into a single entity, Life Insurance Corporation of India in 1956.³⁴ Through two rounds, one each in 1970³⁵ (effective 1969) and 1980,³⁶ it nationalised 20 banks. Over 1972³⁷ and 1973,³⁸ it nationalised 226 coking coal mines and 711 non-coking coal mines. Before the nationalisation of banks, the government had created three development financial institutions—the Industrial Finance Corporation of India (now IFCI) in 1948,³⁹ the Industrial Credit and Investment Corporation of India (now ICICI) in 1955,⁴⁰ and the Industrial Development Bank of India (now IDBI Bank) in 1964.⁴¹ Their inability to deliver the nation's humongous infrastructure requirements was perhaps a reason for the nationalisation of banks. Effectively, therefore, not only was the physical infrastructure under the control of the government, even financial facilitators of long-term funding like banks, insurance companies and financial institutions were closed to private enterprises. Thus, the state took charge of all crucial infrastructure without having adequate state capacity—financial or operational—or knowing whether it encouraged rent-seeking. Less than a decade into freedom, India's infrastructure landscape was ridden with corruption. The 1955 Report of the Railway Corruption Enquiry Committee, for instance, pointed out that every sub-contractor to the Indian Railways had to bribe at least a half-dozen officials.⁴²

Perhaps the nationalisation that had the most impact was that of Maruti Udyog (now, Maruti Suzuki). It is a story that puts together the personal aspirations of then Prime Minister Indira Gandhi's younger son Sanjay Gandhi, whose car-manufacturing enterprise failed, was resurrected by Indira Gandhi through the nationalisation of the company following his death, developed through an international partnership with Japanese car maker Suzuki, disinvested in parts, and finally privatised to become India's most successful and largest car company. The justification of the 27 December 1980 law, the Maruti Limited (Acquisition and Transfer of Undertakings) Act,⁴³ had objectives that were compliant with Socialist thinking of the state managing shortages. These included, "securing the utilisation of the available infrastructure", "modernising the automobile industry", "effecting a more economical utilisation of scarce fuel", and "ensuring higher production of motor vehicles". Unable to see the personal conflict of interest, this is the only time in India's history that a private company, owned by the prime minister's family, was nationalised.

These policies smothered Indian enterprises and kept India's infrastructure, the key determinant that could catalyse the energies of a nation like none other, underserved. They ignored the impact of infrastructure on the Indian economy, the people's aspirations, the innovators' urge to grow, and its politics to deliver prosperity. After 44 years of Independence, by 1991, all that India's economic policymakers could deliver was a GDP of US\$270 billion,⁴⁴ the world's 17th largest after Netherlands, Mexico and Sweden, and a per capita income of US\$300,⁴⁵ the world's 159th after China, Mali and Chad. By most indications, keeping infrastructure under government control had failed to work, and India had become a case study

on why the government had no business being in business.

Despite the consequent economic stagnation, it took a full-blown crisis before India embraced economic reforms in general, and focused on infrastructure in particular. In 1991, as inflation rates reached double digits and foreign exchange reserves dwindled,⁴⁶ India headed towards an economic precipice and needed desperate measures to survive. If the Industrial Policy Resolution of 1956 was the single-most important policy that shut India down, the Statement on Industrial Policy of 1991⁴⁷ was the key that unlocked it.⁴⁸ It not merely opened sectors up but devised a new policy direction that despite its two-steps-forward-one-step-backwards movement since then, pulled up India's GDP to US\$2.5 trillion, the world's fifth-largest, and a per capital income that is close to US\$2,000, giving India aspirations to become a US\$10-trillion economic powerhouse, next to the US and China.

This was also the time that new focus was placed on infrastructure. Four years after the opening up of the economy in 1991, the government created the Department of Industrial Policy and Promotion (DIPP); it would later be reconstituted in 2000 with the merger of the Department of Industrial Development. Of the eight key roles and functions of DIPP, one is to formulate foreign direct investment (FDI) policy. The policy tool it uses is called "press note", which is neither a legislation, nor a rule or a regulation. "Press note" is a term that possibly began as a casual conversation and informal communication that has now been institutionalised in India's policy lexicon. It is a "government decision" with the same power as an order, a rule or a circular. All changes in India's FDI policy have come by way of these press notes; or if they are law, through legislation.

The first major change in the government's stance on bringing in more of the private sector came through Press Note No. 9 (1991 Series),⁴⁹ under which nine industries that were part of Schedule A of the 1956 industrial policy were reduced to eight,⁵⁰ now listed under Schedule I. Among infrastructure and infrastructure-serving industries, coal and lignite, and railway transport continued to remain the preserve of the public sector, while air transportation, telephones and telephone cables, iron and steel, and generation and distribution of electricity were freed for the private sector but through compulsory licensing, under Schedule II.⁵¹ Although inadequate, this was the first big retreat of the state from doing business, riding which followed the sector- and industry-specific policy changes. For a long time, however, the government did not have the economic or political confidence in these policies and continued to be tentative and experimental.

In 1999, for instance, when the government decided to bring 100-percent foreign equity participation in the construction and maintenance of roads, highways, vehicular bridges, toll roads, vehicular tunnels, ports and harbours, it brought them in through the "automatic route" but limited it to INR 15 billion.⁵² The sectoral policy and equity caps for FDI in 2000 provided for allowing 100-percent FDI in special economic zones; distillation and brewing of alcoholic drinks⁵³ and cigarettes⁵⁴ were among those excluded from the 100-percent provision.

In 2001, FDI limits were freed for several sectors⁵⁵ along the same selective terms

that gave control to the government. Among infrastructure, these included 100 percent for airports⁵⁶ (but requiring government approval if it crossed 74 percent); development of townships, hotels, regional level urban infrastructure such as roads and bridges⁵⁷ (development of land would need government approval); and mass rapid transport systems in all metropolitan cities, including associated commercial development of real estate.⁵⁸ Subject to licensing and security requirements, in internet service providers with gateways, radio paging, and end-to-end bandwidth, 74-percent FDI was allowed but if it crossed 49 percent, it needed government approval.⁵⁹ A confounding question arose: if DIPP was not an arm of the government, how was it issuing notifications? Conversely, if DIPP was an arm of the government, what was the meaning of needing government approval? Why was government approval needed for crossing 49 percent in telecom but 74 percent in airports?

Indeed, entrepreneurs require policy stability before they take risks on capital, equity or debt, and convert money into products and services. The tentative and experimental policymaking in India did not deliver that stability. One example relates to the FDI guidelines for developing integrated townships in 2001, presenting opportunities for foreign capital, with the clause that the guidelines would be notified separately. When clarified the next year, 10 guidelines were introduced. These included a minimum area of 100 acres or dwelling units for 10,000 people; a minimum capitalisation of US\$10 million for a wholly-owned subsidiary and US\$5 million for a joint venture with an Indian partner; a minimum lock-in for three years; and land for peripheral services such as police to be handed over free to the government. An entrepreneur putting together a township project in 2001 would need to rework all the numbers the next year. This does not include the troubling issues around investments, such as land acquisition, state regulations, or labour laws.

Subject to variations that come up, from 28 August 2017 onwards there are eight sectors where FDI is prohibited.⁶⁰ Of these, only two relate to infrastructure—atomic energy and railway operations. While keeping atomic energy out of the ambit of FDI can be understood when viewed through the prisms of radiation risks and national security, keeping railway operations out of FDI when roadways or airways have been opened up signals lack of reason. Railways is a sector in dire need for private investments, domestic as well as foreign. A regulator overseeing the sector and a technical entity on the lines of air traffic controller would smoothen the entry of private capital into railways. But Indian Railways is a case study, an epitome of India's political economy and needs to tread on two tracts: freight movement that delivers revenue to feed itself; and passenger fares that cannot be raised due to threats of a political backlash.

Theoretically, there are only 23 sub-sectors of infrastructure on which there are FDI restrictions.⁶¹ But in all other sectors and activities, although 100-percent FDI is permitted through the automatic route, it is subject to sectoral regulations (for ground handling services to airlines), sectoral guidelines (for establishment and operation of satellites), security clearances (for railway infrastructure), and regulatory clearances (for insurance, pensions). Therefore, even where 100-percent FDI is permitted, it is subject to other barriers. The caps take into account the

total foreign investment, direct (FDI) and indirect (through foreign institutional investors). The 12th Plan (2012–17) drafted by the now-defunct Planning Commission estimated a US\$1-trillion investment to finance infrastructure,⁶² of which the share of private sector was to be raised to 48.14 percent from 36.61 percent in the 11th Plan.⁶³ The approximate gap between current investments into infrastructure and annual needs stood at US\$112 billion or about 4.1 percent of GDP.⁶⁴

Capacity to build infrastructure remains a bottleneck

Whatever the texture of the infrastructure project being planned, financed, built or operated—government, private or PPP—the one complex chapter of the Indian infrastructure story has been delays. According to a study⁶⁵ that analysed 894 projects between April 1992 and March 2009, four out of every five projects (82 percent) faced time overruns, while two out of every five (41 percent) experienced cost overruns. Since these projects were undertaken by both private and public sector, the problem seems endemic to India's capacity in delivering projects on time and within budgets. The Bandra-Worli Sea Link, for instance, was planned as a INR 3-billion project and was to be completed by 2004; by the time it finished, with a delay of five years, the actual cost had risen to INR 16 billion.⁶⁶ The study found that large projects have faced much higher cost overruns compared to smaller ones, and the greater the length of the implementation phase, the higher the cost overruns.

Seven sectors—roads, railways, urban development, civil aviation, shipping and ports, and power—experienced longer delays and significantly higher cost escalations. There are five reasons for these time and cost overruns (Ram Singh, 2010).⁶⁷ First, technical factors such as weaker than expected soil quality for a road project. Second, contractual delays due to the inability of both parties to visualise challenges ahead, the need for more manned-crossings in a railway project, for instance. Third, organisational or institutional challenges, such as the lack of cohesiveness between different departments overseeing project implementation, shifting of power lines, water lines, sewer lines, cutting of trees, environmental clearances and so on; or a project running across different states. Fourth, the vicious cycle of time delay nudging a cost increase simply through price inflation between the time the project was planned and cleared to its construction. And fifth, economic factors such as land acquisition or better transport and power in a particular state. Despite all these, India's policy incrementalism has ensured that although delays continue to dog the sector, the trend is positive as both time delays and cost overruns have declined from the 1980s.

One of the biggest hurdles in the way of India's infrastructure creation has been land acquisition. Most of the land acquired for projects such as dams, airports, universities, irrigation, industry, housing and urban development has been done under the Land Acquisition Act⁶⁸ that came into force on 2 February 1894 and has been amended 17 times⁶⁹ since then. The last legislation, The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013,⁷⁰ attempted to smoothen out policy wrinkles such as resettlement—between 1947 and 2004, the number of displaced persons exceeded 60 million (more than the

population of France) in the process of acquiring 25 million hectares of land (more than the area of the UK) with only a third of them being resettled.⁷¹ And despite the fact that as many as 16 laws, including The National Highways Act, 1956, and The Special Economic Zones Act, 2005, have been exempted from the new law, compensation now needs to be paid under the provisions of the new law. As a result, the money the government needs to pay for acquiring land to build national highways has risen by four-and-a-half times between 2014 and 2018.⁷²

The chairman of National Highways Authority of India articulated ground-zero challenges and obstacles in acquiring land in a presentation before a Lok Sabha committee:⁷³ “...the matter of land acquisition is really a very complicated matter. Earlier compensation was paid at previous rates. Since when a new land acquisition legislation was enacted, compensation was paid at new rates. But a number of challenges have come up and numerous discrepancies have been brought to our notice. A number of cases have been filed in various courts. Earlier, people used to hesitate in letting their land to be acquired. When they agree for the same and accept compensation, they move to the courts and file cases against acquisition and about compensation. When we occupy their land physically, they do not allow the work to be started thereon if not satisfied with amount of compensation.” On its part, the Committee noted that the money to be given to farmers on account of their lands being acquired had not reached their banks. Although land is a state subject, land acquisition is a concurrent subject, and both the Central as well as State governments need to work closely to deliver outcomes.

In the attempt to fix compensation and deliver justice to farmers, the new law has raised the hurdles for a crucial component of infrastructure creation. Under the new law, projects under the PPP mode need to acquire 70 percent of the land through negotiations, with the government stepping in only for the balance 30 percent. Going forward, given that India is going to see a rise in the amount of land to be acquired, negotiating this hurdle is going to place steeper challenges before governments and private companies alike. Just land acquisition and securing environmental clearances stalled INR 4.3 trillion worth of projects, of which 60 percent were government projects.⁷⁴ And this is just one example of the confrontation of infrastructure creation with politics. Each additional flashpoint has the potential to raise political fires and compound delays and costs. These include but are not restricted to managing smoother Centre-State relationships, bringing a greater specialisation among bureaucracies, carting technical expertise into the decision-making process, or simply communicating benefits of infrastructure creation to the people with greater conviction.

Conclusions: Reimagining infrastructure policies

The complexity of reimagining India's infrastructure requirements needs greater effort than merely benchmarking against global best practices. Like in every other country, India's political economy is a unique conflagration of varying interests. Primary among them is the question of land acquisition, where a large number of citizens rightly feel they have been excluded and cheated out of lands without resettlement and rehabilitation or even the promised compensation. Those not

owning but living off the land, such as rural labour, add fodder to such interests. Elitism makes matters worse: for instance, a mere 200 families in Chennai are opposing the Chennai Metro Rail passing through their lands⁷⁵—they will possibly get their way, like the elite in Delhi have, unlike the less articulate in rural areas. But land is merely the starting point, an extension of past experiences and the weight of state-supported socialist ideology. Other issues such as designing technically-sound, controversy-free contracts that serve policy outcomes than political or business interests remain a challenge. Finally, the capacity to deliver world-class infrastructure is a function of regulatory policies, rules and regulations that control them. Here too, the Indian state capacity is found wanting.

What is needed is to rethink infrastructure policymaking that takes the market into account. This means, designing policies that leave room for a changing dynamic of financing patterns or technological disruptions, for instance, and allowing contractual renegotiations where necessary. In a world that is besieged by new and often project-changing information that businesses need to work with and adapt to, the rules and regulations appended to those projects too need to move with the times. Shifting infrastructural building to a principles-based approach rather than a rules-based straitjacket may help ease the pressure. This shift need not be absolute—a principles-based architecture that focusses on outcomes supported by rules-based regulations could be an ideal mix to capture the best of both. Communicating with stakeholders across the spectrum through policy disclosures and transparency (putting every rule and regulation up for public debate before enforcing it, for instance) would go a long way in building consensus.

Capacity building needs expertise, and expertise requires knowledgeable people. Rather than making regulatory bodies sinecures for retired bureaucrats, expertise must override all other considerations. Bringing in apolitical professionals from engineering, law, big data, finance and accounts—and perhaps even history—into the regulatory ambit, as executives or consultants, would help sharpen regulatory drafting. Every rule must have a reason for existence, a logic backing that reason, and a cost-benefit analysis that supports it (benefits must outweigh costs). Regulation of infrastructure is really an outsourcing of the government's lawmaking powers, and regulators, while being given independence on the functional side must remain accountable on the governance side; crafting that balance is a new skill that needs working on, as the recent fiasco between the Reserve Bank of India and the government has shown.⁷⁶ While these are broad directions, there is no single silver bullet to fix infrastructure—telecommunications require a different level of oversight from oil and gas, airports and urban development have unique regulatory needs, the complexities of power and water are not the same, the financing needs of roads and ports stand on a separate pedestal than those of railways.

The progress towards delivering infrastructure may not be as fast as India needs, but the trinity of policy evolution has definitely increased the pace between Independence to 1991 and 1991 till date. This progress has been accelerating on all three evolutions that define India's infrastructure story. First, PPPs have come to stay, they are getting sophisticated and are delivering what they promise at a faster rate, best captured by the outstanding world-class performance of India's

telecommunications in general and the shift to 4G infrastructure, in particular. Second, as far as the shift to regulation from direct government control goes, India has created independent agencies to oversee and provide supervision on sectors such as power, telecommunications, and civil aviation and which are delivering oversight that was earlier directly under the government. And third, the consolidation and diversification of institutional funding through multilateral agencies, banking, insurance firms and pension funds on the one side and the regulation and management of public finances getting more sophisticated on the other.

A short-term worry on the infrastructure side is that the number of projects as well as their magnitude has been falling over the past six years.⁷⁷ This fall is crying for attention. From 132 PPP projects worth INR 722.3 billion in 2011-12, the fall has been sharp: 105 and INR 33.5 billion the next year; 66 and INR 24.6 billion in 2013-14; it rose suddenly in 2016-17 to 88 projects and INR 54.5 billion only to crash in 2017-18 to seven projects worth just INR 4.2 billion. But it is not just projects modelled under PPP that have fallen; the entire pipeline of projects—government, private and PPP—has been dismal. After rising to 1,087 projects worth INR 4.5 trillion in 2015-16 and consolidating at 1,174 project worth INR 4.8 trillion the next year, the total number of infrastructure projects fell to 208 and their value to INR 750 billion. So, while the overall activity in building and financing infrastructure has gone down, the fall has been significantly sharper in the case of PPPs. When the new government comes to power in May 2019, rectifying and reversing this trend must be among its first acts.

What remains ambiguous is the way India's political economy responds to hurdle-creating forces such as countries attempting to embrace autarchy over free trade, the movement of global interest rates and currency fluctuations, the volatility in global oil prices, or simply the failure of businesses to deliver due to market risk. If we revert to mean, it would unleash yet another era of allegation politics, where one party would raise allegations that would create hurdles on the execution side through legal delays. On the other hand, if India is able to reboot its stance and relook at infrastructure as a lever to reach a US\$10 trillion GDP and a middle income economy through long-gestation projects that thrive across governments of different hues, only then would India's infrastructure story reach a fitting finale. The trinity that has delivered speed to India's economic system with its actions so far now needs to deliver stability, and through it infuse credibility into the political system. Stepping back, we see India's infrastructure story as one with a tremendous upside. This has the potential to deliver a transformative impact for the world's fastest-growing economy and its people's well-being. But remaining within the boundaries and the rich and sophisticated confines of the country's democracy, it will reach out to its under-served people, catalyse their democratic expressions, and rework new and aspirational outcomes. As a result, it will be the world's largest laboratory to track the evolution of regulatory experiments.

Endnotes

- 1 V.I. Lenin, Notes for a Report: "Five Years of the Russian Revolution and the Prospects of the World Revolution" at the Fourth Congress of the Comintern (13 November 1922), V.I. Lenin, Collected Works, Volume 36 (1900-1933), Translated from the Russian by Andrew Rothsein, Edited by Yuri Sdobnikov, Progress Publishers, Moscow, pp 585-587, <https://ia802707.us.archive.org/14/items/LeninCW/Lenin%20CW-Vol.%2036.pdf>, Accessed on 12 December 2018
- 2 What is a PPP: Defining "Public-Private Partnership", PPP Knowledge Lab, <https://pppknowledgelab.org/guide/sections/3-what-is-a-ppp-defining-public-private-partnership>, Accessed on 21 June 2018
- 3 Developmental History of Bhakra – Nangal Dam Project, Bhakra Beas Management Board, <http://bbmb.gov.in/bhakra-project.htm>, Accessed on 3 January 2018
- 4 Operation, Management and Development Agreement between Airports Authority of India and Delhi International Airport Private Limited for Delhi Airport, 4 April 2006, Ministry of Civil Aviation, Government of India, http://www.civilaviation.gov.in/sites/default/files/moca_000971.pdf, Accessed on 12 December 2018
- 5 The Reserve Bank of India Act, 1943 (As amended by the Finance Act, 2018), Reserve Bank of India, Accessed 12 December 2018, <https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/RBIA1934170510.PDF>.
- 6 The Insurance Regulatory and Development Authority Act, 1999, Ministry of Finance, Government of India, Accessed 12 December 2018, https://financialservices.gov.in/sites/default/files/IRDA_ACT_1999.pdf.
- 7 The Securities and Exchange Board of India Act, 1992 [As amended by the Securities Laws (Amendment) Act, 2014], Securities and Exchange Board of India, Accessed 12 December 2018, https://www.sebi.gov.in/sebi_data/attachdocs/1456380272563.pdf.
- 8 The Pension Fund Regulatory and Development Authority Act, 2013, The Gazette of India, Ministry of Law and Justice, Pension Fund Regulatory and Development Authority of India, Accessed 12 December 2018, <https://www.pfrda.org.in/myauth/admin/showimg.cshmt?ID=353>.
- 9 The Telecom Regulatory Authority of India Act, 1997, As Amended by TRAI (Amendment) Act, 2000, Telecom Regulatory Authority of India, 28 March 1997, Department of Telecommunications, Government of India, Accessed 12 December 2018, http://www.dot.gov.in/sites/default/files/TRAI%20Act%20%282%29_0.pdf?download=1
- 10 Resolution No. 0-20013/2/92-ONG D III, Ministry of Petroleum and Natural Gas, Government of India, 8 April 1993, Accessed 12 December 2018, http://petroleum.nic.in/sites/default/files/dghres_0.pdf
- 11 The Competition Act, 2002, Competition Commission of India, Accessed 12 December 2018, https://www.cci.gov.in/sites/default/files/cci_pdf/competitionact2012.pdf.
- 12 Securities and Exchange Board of India Act, 1992 [As amended by the Securities Laws (Amendment) Act, 2014], Chapter VIB, Securities and Exchange Board of India, Accessed 17 December 2018, https://www.sebi.gov.in/sebi_data/attachdocs/1456380272563.pdf
- 13 The Companies Act, 2013, Chapter XXVII, 29 August 2013, Ministry of Corporate Affairs, Government of India, Accessed 17 December 2018, <http://www.mca.gov.in/Ministry/pdf/CompaniesAct2013.pdf>
- 14 Maya Chadda, India in 2012: Spiraling Down?, Asian Survey, Volume 53, No. 1, University of California Press, January/February 2013, pp. 47-63, Accessed 24 January 2019, <https://www.jstor.org/stable/10.1525/as.2013.53.1.47>
- 15 Sandip Sukhtankar, The Impact of Corruption on Consumer Markets: Evidence from the Allocation of Second- Generation Wireless Spectrum in India, The Journal of Law & Economics, Volume 58, No. 1, The University of Chicago Press for The Booth School of Business, University of Chicago and The University of Chicago Law School, February 2015, pp. 75-109, Accessed 24 January 2019, <https://www.jstor.org/stable/10.1086/682909>
- 16 8th Five Year Plan, Volume 1, Paras 1.4.26 to 1.4.30, Planning Commission, Government of India, July 1992, Accessed 17 December 2018, <http://planningcommission.nic.in/plans/planrel/fiveyr/8th/vol1/8ch1.htm>
- 17 Consultation Paper on Auction of Spectrum in 700 MHz, 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300-3400 MHz and 3400-3600 MHz bands, Consultation Paper No. 10/2017, Telecom Regulatory Authority of India, 28 August 2017, https://www.trai.gov.in/sites/default/files/Spectrum_CP_28082017.pdf, Accessed on 21 June 2018
- 18 Consultation Paper on Spectrum related issues: Efficient Utilisation, Spectrum Allocation, and Spectrum Pricing, Telecom Regulatory Authority of India, 31 May 2004, <https://www.trai.gov.in/sites/default/files/consultation-paper-on-spectrum-released.pdf>, Accessed on 21 June 2018
- 19 Maya Chadda, India in 2011: The State Encounters the People, Asian Survey, Volume 52, No. 1, University of California Press, January/February 2012, pp. 114-129, Accessed 24 January 2019, <https://www.jstor.org/stable/10.1525/as.2012.52.1.114>
- 20 Kenneth W. Hansen, PRI and the Rise (and Fall?) of Private Investment in Public Infrastructure, Theodore H. Moran, Editor, International Political Risk Management: The Brave New World, The International Bank for Reconstruction and Development / The World Bank, 2004, Accessed on 12 December 2018, <http://documents.worldbank.org/curated/en/637611468762910828/pdf/280440PAPER0International0political0risk.pdf>

- 21 Ibid., Hansen
- 22 India's Dabhol Power Plan Controversy: Actors and Motivations, Central Intelligence Agency, Directorate of Intelligence, 31 May 2001, Accessed on 12 December 2018, https://www.cia.gov/library/readingroom/docs/DOC_0001064509.pdf
- 23 Ingo Walter, Editor, Chapter: Identification and Mitigation of Project-related Risks, Book Title: The Infrastructure Finance Challenge, Stern School of Business and New York University, Open Book Publishers, 2016, Accessed on 12 December 2018, <https://www.jstor.org/stable/j.ctt1sq5v21.14>
- 24 Timothy Irwin, Michael Klein, Guillermo E. Perry and Mateen Thobani, Managing Government Exposure to Private Infrastructure Risks, The World Bank Research Observer, Vol. 14, No. 2 (August 1999), Oxford University Press, pp. 229-245, Accessed on 12 December 2018, <https://www.jstor.org/stable/3986366>
- 25 Kenneth W. Hansen, PRI and the Rise (and Fall?) of Private Investment in Public Infrastructure, Theodore H. Moran, Editor, International Political Risk Management: The Brave New World, The International Bank for Reconstruction and Development / The World Bank, 2004, Accessed on 12 December 2018, <http://documents.worldbank.org/curated/en/637611468762910828/pdf/280440PAPER0International0political0risk.pdf>
- 26 Ibid., Hansen
- 27 Infrastructure Projects - Year Wise Summary Report, Department of Economic Affairs, Ministry of Finance, Government of India, Accessed on 30 November 2018, <https://www.pppinindia.gov.in/infrastructureindia/web/guest/year-wise>
- 28 Gazette of India, Notification, Infrastructure Policy and Programme Section, Department of Economic Affairs, Ministry of Finance, 14 November 2017, <https://dea.gov.in/sites/default/files/Harmonized%20List%20Infra%20subSec17112017.pdf>, Accessed on 22 June 2018
- 29 Industrial Policy Resolution, Schedule A, 30 April 1956, Para 8, p. 2, http://dipp.nic.in/sites/default/files/chap001_0_0.pdf, Accessed on 21 June 2018
- 30 Ibid., p. 5
- 31 List of Foreign Satellites Launched by PSLV, Indian Space Research Organisation, Department of Space, Government of India, https://www.isro.gov.in/sites/default/files/article-files/missions-0/237_foreign_satellites.pdf, Accessed on 22 June 2018
- 32 The Air Corporations Act, 1953, Directorate General of Civil Aviation, Government of India, 28 May 1953, Accessed on 13 December 2018, http://dgca.nic.in/nat_conv/NatConv_Chap1.pdf
- 33 Arijit Mazumdar, Deregulation of the Airline Industry in India: Issues, Causes and Rationale, The Indian Journal of Political Science, Volume 70, No. 2, Indian Political Science Association, April-June 2009, pp. 451- 469, Accessed 24 January 2019, <https://www.jstor.org/stable/42743909>
- 34 The Life Insurance Corporation Act, 1956, Life Insurance Corporation of India, India Code, 18 June 1956, accessed 17 December 2018, <https://www.licindia.in/Bottom-Links/licact>
- 35 The Banking Companies (Acquisition and Transfer of Undertakings) Act, 1970, Syndicate Bank, 19 July 1969, accessed 17 December 2018, https://www.syndicatebank.in/Downloads/Banking_Companeis_Acquisition-and-Transfer-of-Undertakings-Act-1970.pdf
- 36 The Banking Companies (Acquisition and Transfer of Undertakings) Act, 1980, Ministry of Law and Justice, Government of India, 11 July 1980, accessed 4 January 2018, <http://www.legislative.gov.in/sites/default/files/A1980-40.pdf>
- 37 The Coking Coal Mines (Nationalisation) Act, 1972, India Code, Government of India, 17 August 1972, Accessed 17 December 2018, https://indiacode.nic.in/admin/view-casepdf?type=repealed&id=AC_CEN_8_8_00008_197236_1517807324682
- 38 The Coal Mines (Nationalisation) Act, 1973, Ministry of Coal, 30 May 1973, accessed 8 January 2018, https://coal.nic.in/sites/upload_files/coal/files/curentnotices/act1973_0_0.pdf
- 39 The Industrial Finance Corporation Act, 1948, Indian Kanoon, 27 March 1948, <https://indiankanoon.org/doc/1958646/>, Accessed on 22 June 2018
- 40 International Bank for Reconstruction and Development, International Organization, Volume 9, No. 2, University of Wisconsin Press, May 1955, pp. 272-274, <http://www.jstor.org/stable/2704878>, Accessed on 22 June 2018
- 41 The Industrial Development Bank of India Act, 1964, The Indian Lawyer, 16 May 1964, <http://www.theindianlawyer.in/statutesnbareacts/acts/i65.html>, Accessed on 22 June 2018
- 42 James C. Scott, The Analysis of Corruption in Developing Nations, Comparative Studies in Society and History, Volume 11, No. 3, June 1969, Cambridge University Press, pp. 331, Accessed on 12 December 2018, <https://www.jstor.org/stable/178088>
- 43 The Maruti Limited (Acquisition and Transfer of Undertaking) Act, 1980, The Indian Lawyer, 27 December 1980, accessed 12 December 2018, <http://www.theindianlawyer.in/statutesnbareacts/acts/m26.html>
- 44 GDP (current US\$), The World Bank, <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD>, Accessed on 22 June 2018
- 45 GDP per capita (current US\$), The World Bank, <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=IN>,

Accessed on 22 June 2018

- 46 Rakesh Mohan, *India Transformed: 25 Years of Economic Reforms*, Penguin Random House India, 2017, p. 6
- 47 Statement on Industrial Policy, Department of Industrial Policy and Promotion, Government of India, 24 July 1991, pp 9-18, http://dipp.nic.in/sites/default/files/chap001_0_0.pdf, Accessed on 22 June 2018
- 48 Gautam Chikermane, 70 Policies that Shaped India: 1947 to 2017, Independence to \$2.5 Trillion, Observer Research Foundation, 27 July 2018, pp. 81-82, Accessed 24 January 2019, <https://www.orfonline.org/research/70-policies-that-shaped-india-1947-to-2017-independence-to-2-5-trillion/>
- 49 Changes in procedures for industrial licensing, Exhibit No. 7, Press Note No. 9 (1991 Series), 2 August 1991, p. 23, http://dipp.nic.in/sites/default/files/chap002_0.pdf, Accessed on 22 June 2018
- 50 Ibid., Annex I, Proposed list of industries to be reserved for the public sector, p. 26
- 51 Ibid., Annex II, List of industries in respect of which industrial licensing is compulsory, p. 27
- 52 Press Note No. 1 (1999 Series), Department of Industrial Policy & Promotion, Ministry of Industry Government of India, 4 January 1999, http://dipp.nic.in/sites/default/files/pn11_0.pdf, Accessed on 22 June 2018
- 53 Press Note No. 10 (2000 Series), Para I (d), Department of Industrial Policy & Promotion SIA (FC Division), Ministry of Commerce & Industry, Government of India, 10 October 2000, <http://dipp.nic.in/sites/default/files/pn31.pdf>, Accessed on 22 June 2018
- 54 Ibid., Para I (e)
- 55 Press Note No. 4, Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India, <http://dipp.nic.in/sites/default/files/pn25.pdf>, Accessed on 22 June 2018
- 56 Ibid., Para ii
- 57 Ibid., Para iv
- 58 Ibid., Para vii
- 59 Ibid., Para ix
- 60 Consolidated FDI Policy, Para 5.1, Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India, 28 August 2017, p. 20, http://dipp.nic.in/sites/default/files/CFPC_2017_FINAL_RELEASED_28.8.17_0.pdf, Accessed on 22 June 2018
- 61 Consolidated FDI Policy, Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India, 28 August 2017, http://dipp.nic.in/sites/default/files/CFPC_2017_FINAL_RELEASED_28.8.17_0.pdf, Accessed on 22 June 2018
- 62 Twelfth Five Year Plan (2012–2017): Faster, More Inclusive and Sustainable Growth, Volume I., Para 1.88, p. 18, Planning Commission, Government of India, p. 88, http://planningcommission.gov.in/plans/planrel/fiveyr/12th/pdf/12fyp_vol1.pdf, Accessed on 22 June 2018
- 63 Ibid., Para 3.67
- 64 Meeting Asia's infrastructure needs, Asian Development Bank, 2017, Accessed on 14 December 2018, <https://www.adb.org/sites/default/files/publication/227496/special-report-infrastructure.pdf>
- 65 Ram Singh, Delays and Cost Overruns in Infrastructure Projects: Extent, Causes and Remedies, *Economic and Political Weekly*, Volume 45, No. 21, 22-28 May 2010), pp. 43-54, Accessed 14 December 2018, <https://www.jstor.org/stable/27807050>
- 66 Ibid.
- 67 Ibid.
- 68 The Land Acquisition Act, 1894, Revenue and Disaster Management Department, Government of Meghalaya, 2 February 1894, Accessed 15 December 2018, <http://megrevenueadm.gov.in/acts/land-aquisition-act-1894.pdf>.
- 69 The Land Acquisition, Rehabilitation and Resettlement Bill, 2011, Legislative Bulletin, Research and Information Division, Lok Sabha Secretariat, April 2013, Accessed 15 December 2018, http://164.100.47.193/intranet/Legislative_Bulletin_English.pdf
- 70 The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, The Gazette of India, Ministry of Law and Justice, Government of India, 26 September 2013, accessed 15 December 2018, <http://indiacode.nic.in/acts-in-pdf/302013.pdf>
- 71 Development Challenges in Extremist Affected Areas, Report of an Expert Group to Planning Commission, Para 1.12.3, Planning Commission, Government of India, 15 April 2008, accessed 15 December 2018, <https://www.tribal.nic.in/writereaddata/AnnualReport/DevelopmentChallengesinExtremistAffectedAreas.pdf>.
- 72 Dipak K. Dash, Govt payout to acquire land for NHs rises 4.5 times in 4 years, TNN, The Times of India, 14 December 2018, Accessed 15 December 2018, <https://timesofindia.indiatimes.com/india/govt-payout-to-acquire-land-for-nhs-rises-4-5-times-in-4-years/articleshow/67084880.cms>

- 73 Nineteenth Report of the Committee on Public Undertakings (2017-18), Sixteenth Lok Sabha, National Highways Authority of India, Ministry of Road, Transport and Highways, Lok Sabha Secretariat, 2 August 2017, Accessed 15 December 2018, http://164.100.47.193/lsscommittee/Public%20Undertakings/16_Public_Undertakings_19.pdf
- 74 Asian Development Outlook 2018: How Technology Affects Jobs, Asian Development Bank, April 2018, Accessed on 15 December 2018, <https://www.adb.org/sites/default/files/publication/411666/ado2018.pdf>
- 75 Sreedevi Jayarajan, Nungambakkam, T. Nagar residents oppose land acquisition for Chennai metro line, The News Minute, 16 December 2018, Accessed on 17 December 2018, <https://www.thenewsminute.com/article/nungambakkam-t-nagar-residents-oppose-land-acquisition-chennai-metro-line-93453>
- 76 Gautam Chikermane, "RBI versus the Government: Independence and Accountability in a Democracy", Occasional Paper No. 179, December 2018, Observer Research Foundation, Accessed on 17 December 2018, <https://www.orfonline.org/research/rbi-versus-the-government-independence-and-accountability-in-a-democracy-46085/>
- 77 Infrastructure Projects - Year Wise Summary Report, Department of Economic Affairs, Ministry of Finance, Government of India, Accessed on 30 November 2018, <https://www.pppinindia.gov.in/infrastructureindia/web/guest/year-wise>

Financing Urban Infrastructure for an Evolving India

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Introduction

At the launch of the Smart Cities Mission in 2016, Prime Minister Modi made the case that urbanisation was an opportunity to be harnessed and that cities had the potential to alleviate poverty. We know this to be true globally. Approximately 55 percent of the global urban population generates roughly 80 percent of the global gross domestic product (GDP).¹ In purchasing power parity (PPP) terms, the economies of New York and Tokyo have generated a higher GDP than countries like Canada, Australia, Turkey and Spain, in certain years. The World Economic Forum² estimates that 400 cities will contribute to nearly half the economic growth over the next decade. The prime minister's remarks marked a welcome change in the attitude towards urban growth in India. For years, Indian policymakers have attempted to decongest cities, and limit growth via green belts or by forcing industries, universities and businesses to locate outside cities.

While recognising the importance of cities is critical, it is equally important that we plan and manage them in a way that is conducive to growth. Duranton³ has shown that the strong correlation between urbanisation and growth has begun to break down, particularly in the developing world. Recent years have seen urbanisation without growth: the widely touted agglomeration benefits do not hold if the increase in population is not matched with commensurate economic opportunities and the mechanisms to make them possible.

Alain Bertaud rightly characterises cities as labour markets, arguing that: "...as long

as a labour market does not fragment into adjacent, smaller ones as it grows, the larger the market, the more innovative and productive the city will be.”⁴ In this context, infrastructure—particularly transit infrastructure—is critical to facilitating productivity, economic activity and quality of life in cities. The lack of infrastructure impedes mobility, access to opportunities, and the transport of goods and services, which impacts the health and well-being of residents.

India’s urban infrastructure is ill-equipped to enable growth. In 2011, a High-Powered Expert Committee (HPEC) was set up by the Ministry of Urban Development to estimate the investment requirements for urban infrastructure and services. The HPEC estimated that a whopping INR 39 lakh crore (INR 59 lakh crore in current prices) was required over a 20-year period, for capital expenditure. They estimated an additional INR 20 lakh crore (INR 30.4 lakh crore in current prices) for operations and maintenance (O&M). Forty-four percent of the requirement was for urban roads; the committee noted that 50–80 percent of this was to make up for an existing backlog in the sector. Another 20 percent was estimated for water supply, solid waste management and storm water drains, and roughly 10 percent was set aside for renewal and redevelopment (including slums).

A year before this, the McKinsey Global Institute estimated an outlay of INR 53 lakh crore (INR 85 lakh crore in current prices) required as capital expenditure for infrastructure. On a per capita basis, they calculated a required total spending of US\$134 per head, of which affordable housing should be US\$44, urban roads US\$22 and water US\$10. Yet, India only spent US\$17 per capita, 14 percent of China’s US\$116 and four percent of the United Kingdom’s US\$391 per head.⁵

The urban infrastructure requirement is just a subset of the national infrastructure investment requirement of US\$526 billion, which includes financing required for national highways, energy, railways and other core sectors.⁶ While the 2008–12 public–private partnership (PPP) boom saw the entry of significant pools of private capital into the broader infrastructure sector, the situation has changed significantly since 2013. Stalled private capex projects now stand at a high of 24 percent, compared to a long-term average of 13 percent.⁷

This chapter attempts to address some of the financing concerns around urban infrastructure in India. It discusses why private capital is unlikely to meet the requirements of this sector and suggests that the government—central, state, and local—must play a larger role. It then seeks to expand the conversation around infrastructure financing, arguing that a proactive approach to dealing with urbanisation is critical to keep future infrastructure requirements in check. India’s urbanisation represents a fundamental spatial and economic restructuring of where people live and work. To plan and finance infrastructure, policymakers require a deeper understanding of the contours of urbanisation. A strong but flexible planning regime that anticipates urban growth can help leverage additional sources of financing and address long-term environmental sustainability concerns.

Private Capital Will Supply Only a Fraction of the Investment Requirement

Private capital is unlikely to fill much of the investment gap in urban infrastructure. There is a subset of projects (of specific sizes and risk profiles) that will attract private capital. These may include large transportation projects, e.g. metros, airports, housing or slum redevelopment projects. However, most projects are either too small or do not have reliable revenue streams to attract large private investors.

Private investors face several challenges when it comes to urban infrastructure in particular. The first is difficulty in dealing with urban local bodies (ULBs). Thus, most PPP projects are executed with state agencies or via special-purpose vehicles. ULBs have weak finances: municipal revenue streams are uncertain, and they remain heavily dependent on transfers from state governments. Cities can only levy those taxes that state governments devolve to them, which usually exclude buoyant taxes such as profession tax, entertainment tax or advertisement tax, which are linked to the underlying economic dynamism of the city. This is compounded by a lack of transparency. Despite a concerted push under the Jawaharlal Nehru Urban Renewal Mission, virtually no municipality publishes annual, audited accounts. This gives investors no mechanism to evaluate the credit-worthiness of a municipal body. Municipal revenues usually accrue to a consolidated fund, with little clarity on which claims get priority. In contrast, the National Highways Authority of India has a clear “waterfall” structure, with tolls ring-fenced within an escrow account to assure developers and their lenders of payment. ULBs are also hobbled by severe capacity constraints, which complicates the bidding process. Staff often lack the ability to design and evaluate bid criteria, leading to selection on the basis of cost, with no emphasis on maintenance or quality. Political interference is another concern, with bid criteria often being changed to suit local developers or contractors.⁸ The tangle of overlapping jurisdictions—between municipal bodies, state agencies and other bodies at the local level—further reduces accountability and expediency. According to the HPEC report, for a given project, the state Public Health Engineering Division may handle the capital expenditure while the municipal body handles O&M and revenue.

A second concern for the private sector is the inability of cities to properly levy user charges, i.e. fees for municipal services provided. ULBs are inefficient in collecting user charges, and the charges themselves are usually subsidised and not linked to the cost of providing the service. For example, the Atal Mission for Rejuvenation and Urban Transformation urged local bodies to rationalise their water tariffs and incentivised additional financing, contingent on improvements in levy and collection of user charges. Local bodies were unable to recover the O&M costs of supply water, primarily because, while fixing tariffs, the capital cost of supplying and the willingness and ability of consumers to pay were not considered. The efficiency of collection of such charges was also poor due to incorrect meter readings, the absence of proper customers records, and faulty and obsolete pipeline networks, resulting in poor service delivery.⁹ There are, however, some instances of success. The Amritsar Intercity Bus Terminal is a rare transportation project

that was executed by recovering the cost from user chargers alone. Similarly, both Navi Mumbai and Chennai sell their treated wastewater to industries, which helps recover some of their capital and O&M costs. The recent Toll-Operate-Transfer model of the National Highways Authority of India may offer lessons for any urban infrastructure project with stable cash flows.

Finally, even where funds exist, execution can be a problem. Municipal bonds are often touted as a financing solution. In India, they have financed only one percent of total ULB revenues as opposed to 10 percent in the United States. The first Indian municipal bond was issued in 1997 by the Bangalore City Corporation and was backed by a state government guarantee.¹⁰ Since then, there have only been a handful of issues, most of which have required a state government backstop. Yet, execution remains a concern, even when the funds are in place. In 2017, the Pune Municipal Corporation led a successful municipal bond issue. They had a strong credit rating of AA+, and the corporation protected the project revenues with contractual obligations and ensured a structured payment mechanism. The mechanism included an escrow account (where money raised from property tax and water user charges were parked), a debt service reserve account, an interest payment account, and a sinking fund account to be managed and monitored by the trustees. The bond issued by the Pune Municipal Corporation was the first in a span of 14 years, and they raised a first tranche of INR 200 crores (of a total INR 2,264 crores) at a coupon rate of 7.59 percent for a water-metering project.¹¹ However, the project for which the money was raised has not taken off due to issues with tendering. The money raised has now been parked in a fixed deposit at the rate of 5–6 percent, which is less than the interest it needs to pay on the bond issue.¹² Therefore, any attempt to bring in private capital must first address underlying implementation issues.

Fixing the governance, financing and capacity issues that plague municipalities will require time and sustained investment. Progressive municipalities that are making efforts to overcome these hurdles should be lauded for their success. However, the active cooperation of other levels of government is also critical.

Government Must Play a Larger Role

The Indian government will have to finance a larger share of the infrastructure investment requirement. While Tier 1 and 2 cities have the potential to generate a larger share of their own revenue, smaller cities will remain more heavily dependent on state and national governments. In the UK, the central government continues to fund the bulk of urban services, with over 50 percent of London's spend coming from central government grants.¹³ South African cities depend equally on their own revenue and on central government grants, whereas in the US, cities depend much more on their own tax revenues. Two key sources of money, particularly for capital expenditure, should be land monetisation and transfers.

Land Monetisation: The most straightforward means of land monetisation is the direct sale of land by government departments. Most government departments, whether central, state or local, own large parcels of land in cities, which are often

grossly underutilised. For instance, the army owns prime real estate in the heart of Pune, as does the Indian Navy in Mumbai. Both could rationalise their land use and monetise some, if not all, of it. The Mumbai Port Trust owns roughly 1,800 hectares of land along the eastern waterfront of the city and estimates that the sale of even small parcels will be enough to finance world-class infrastructure in the area. A 2012-13 study in Ahmedabad, which used satellite data to estimate the value of large public land-holdings (excluding smaller parcels), calculated that the city could raise between INR 20,000 crore and INR 54,000 crore through the sale of these parcels.¹⁴ On a per capita basis, this translates to financing resources of INR 36,000 to INR 97,000 per city resident. In 2009-10, HPEC had estimated a per capita investment cost of INR 43,386 (INR 73,669 in current prices) for the entire range of physical urban infrastructure for the next 20 years.

There are other options too. Given a rational Floor Space Index (FSI) policy (which dictates how much floor area can be built on a given plot), government buildings could open themselves up to redevelopment and sell floor space in their buildings. However, managing the politics around this will be critical. What incentive do state and central government bodies have to sell their assets, downsize their buildings and plots, and hand the money over to the ULB? What will it take for state or central governments to share the proceeds of land sales with the local government?

Transfers: Another significant revenue source can be transfers, particularly those funded by buoyant tax revenues from the economic activities in cities. There have been some efforts towards this. The 13th Finance Commission of the Government of India suggested that the goods and services tax (GST) was well suited for direct allocation to local government. In the subsequent rollout of GST, no such allocation was made, even though GST replaced the octroi, which formed a significant part of city revenues. The Finance Commission further suggested that two percent of all taxes in the divisible pool be shared with the local government. Going forward, it is critical for cities to benefit from the economic activity that they drive: McKinsey¹⁵ estimates that the urban economy will generate 85 percent of tax revenue by 2040. A recent Oxford Economics study shows that the fastest-growing cities—in economic terms, between 2019-35— are all in India.

Two other important sources of revenue, particularly for O&M, are property taxes and user charges.

Property Tax: Most Indian cities charge little as property tax and don't have complete coverage. Property tax is the key financing instrument of local governance bodies around the world. In theory, it is difficult to evade, less efficiency-distorting and can be progressive, if calculated and structured properly. ULBs have underutilised property tax as a revenue-generating source; India's property tax-to-GDP ratio, at 0.48 percent, is one of the lowest amongst G-20 countries, compared to 1.39 percent and 1.25 percent for South Africa and Brazil respectively.¹⁶ Municipal property tax revenues in the 36 largest cities in India have been estimated at just six percent of the gross rental value of urban dwellings, as estimated in the National Accounts Statistics.¹⁷

Reforming property tax and ensuring buoyancy will require increasing the tax rate, expanding the size of the revenue base and improving collection efficiency. Currently, stamp duty is charged on the circle rate, or the ready-reckoner rate, which is the value determined by the local state government's revenue departments or the local development authorities. The circle rate tends to be lower than the market rate, and therefore property tax is under-collected. It is equally important to expand the revenue base to ensure that a small number of taxpayers are not overburdened.

User Charges: As discussed previously, cities must expand the practice of levying user charges. To do so, they must break out of a low-level equilibrium, where bad service delivery has led to low compliance, with users reluctant to pay for services. Improved service delivery may help citizens see the value in paying for services.

There is a larger conversation to be had on infrastructure, which requires an understanding of how the spatial reality of India's urbanisation is changing. Understanding this process not only lends greater texture to the financing conversation, but also underscores the need for a robust planning process that can keep future infrastructure requirements in check and act as a tool to leverage additional finance.

Financing Infrastructure for an Evolving Urban India

A country urbanises only once; yet, a failure to appreciate the importance and complexity of this historic shift has led to India neglecting its cities. Even as policy attention starts to shift to improving existing cities, there is little focus on the ongoing process of urbanisation.

It is easy to do this, because the current method of measuring urbanisation obscures the reality in front of us. There are two official definitions of urbanisation in India: the statutory definition, which depends on individual state government definitions (that vary widely), and the Census, which applies a uniform three-part definition across the country. By the statutory definition, India is 26 percent urban; on the back of this definition, 26 percent of the population is granted a municipal government, which is required to provide a range of infrastructure and services from sewerage to garbage disposal and fire safety, as laid out in the Constitution. On the other hand, the Census puts India at 31 percent urban; in 2011, the three-part definition identified 'urban areas' as those with a population above 5,000, a population density of 400 persons per square kilometre, and where 75 percent of the male workforce was engaged in non-agricultural activities.

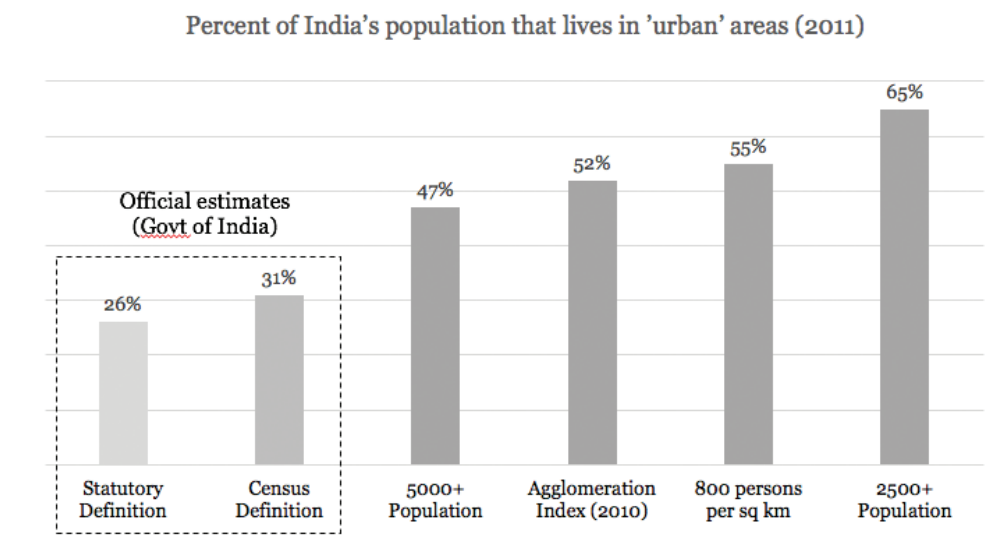
These settlements that fall into the gap between the two definitions are called Census Towns (CTs), i.e. towns defined as urban by the Census but not by their state government. In 2011, there were 3,894 CTs that were home to roughly 55 million people. CTs have the density of urban areas but are governed by local village governments (panchayats), who do not have the mandate to provide them with the urban amenities required by high-density living, e.g. sewerage lines, building codes and fire services.

Both definitions uphold the narrative that India is predominantly a rural country and, therefore, justify the policy neglect of cities. However, this will change if the definition of 'urban' is changed, even slightly.

A group at the IDFC Institute ran an exercise to see what would happen if some of the most commonly used global definitions of 'urban' were applied to Indian Census data.¹⁸ There is no global definition of what constitutes an urban area. Mexico and Venezuela, for instance, use a population threshold of 2,500 people. The US uses a 2,500-person cut-off, but adds a density criterion. China, the only country more populous than India, uses a density criterion of 1,500 people per square kilometre, but recently broadened its definition of 'urban' to include villages that are either directly connected to municipal infrastructure, or that receive public services from urban municipalities. The chart below shows four alternate scenarios: two use common population cut-offs of 2,500 and 5,000, a pure density threshold (double the one currently used by the Census) and the World Bank's agglomeration index, which seeks to classify urban areas using a measure of their economic significance. Using alternate estimates, India could be anywhere between 47 to 65 percent urban, though the real number probably lies somewhere in between.

Using administrative data has limitations. The alternate estimates above merely apply a different threshold to data that is collected within fixed administrative units such as census wards or municipal boundaries, which often vary in size. Moreover, they tell you little about what is happening in adjacent units; for instance, while two individual units may fall under the threshold, taken together, they may have the characteristics of an urban area.

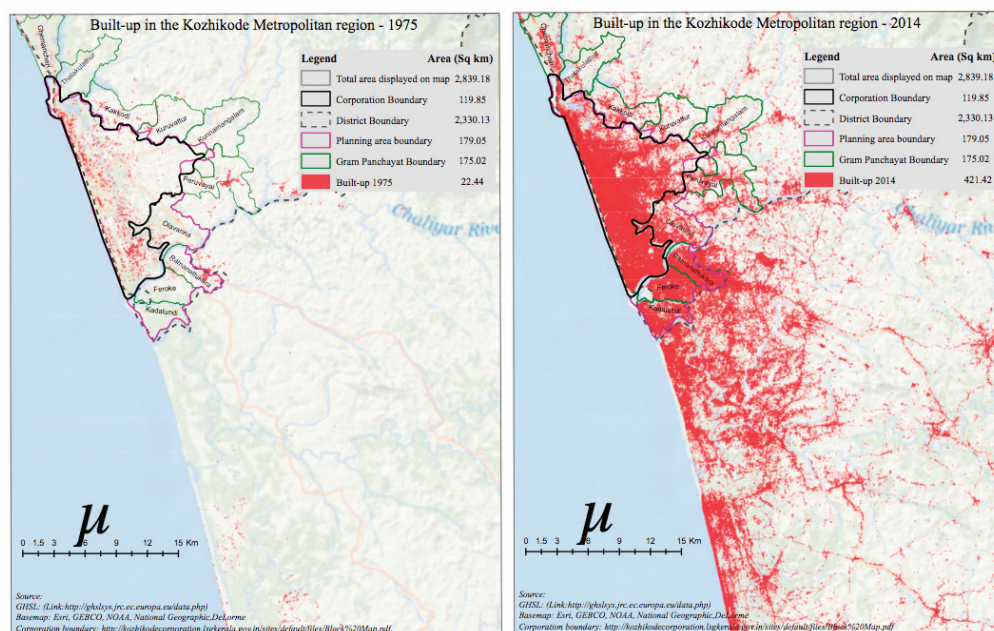
Figure 1: Could India be More Urban Than We Think?



Source: [L-R] Government of India, Census of India 2011, IDFC Institute analysis, Uchida and Nelson 2010, Jana, Sami & Seddon 2014, IDFC Institute analysis.

This is where satellite data provides a clearer picture. The map of Kozhikode below is instructive. In 1975, urban built-up area was contained within municipal boundaries. By 2014, it had spilled well past municipal limits into surrounding rural areas, and even into the neighbouring district. A district urbanisation report for Kozhikode documented the nature of economic activity in the surrounding villages and recommended that they be converted to urban areas. However, that has not happened to date. As a result, what appears to be the functional economic unit—or a unified labour market—is managed in a fragmented manner across rural and urban administrations. Moreover, there is no metropolitan or regional authority in place to coordinate between them on core infrastructure, like transport or electricity.

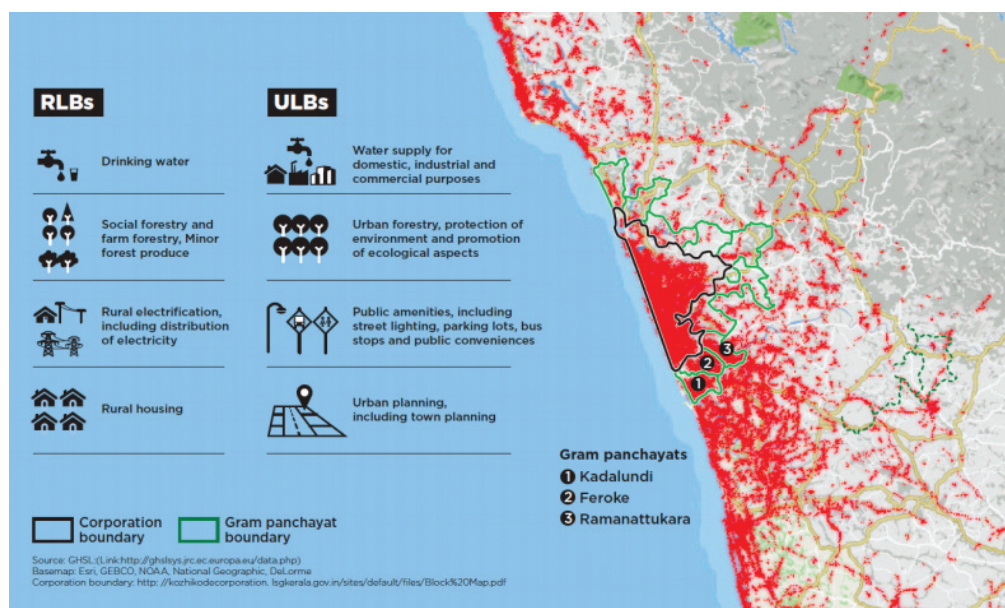
Figure 2: Built-up Area in the Kozhikode Metropolitan Area: 1975 vs. 2014



The result is deeply troubling from an infrastructure, services, and economic productivity perspective. During 2014-15, New York University's Urban Expansion Observatory used the same satellite data to study the quality of the urban fabric in 200 cities across the world. The study contrasted the quality of pre-1990 urban fabric with that of peri-urban growth from 1990-2014, with the intention of evaluating how cities across the world have managed urban expansion. Indicators of quality included the availability of open space, access or distance to an arterial road, the average width of roads, subdivision of plots (regular or haphazard delineation) and average density.

The results for Kozhikode are telling. In pre-1990 Kozhikode, the average road width was 9.84 metres, which fell to just 4.03 metres in the 1990-2014 growth area. More importantly, the density of arterial roads per block (which carry transit as well as core infrastructure lines) fell to just 30 percent of the density in 1990. This has direct implications for the use of mass public transit in an area, and for

Figure 3: Fragmented Governance Affects Service Delivery across the Region



walkability. This pattern repeats itself across the country. Of the 17 Indian cities studied, almost all (with the notable exception of Ahmedabad) show a sharp drop in the urban fabric.

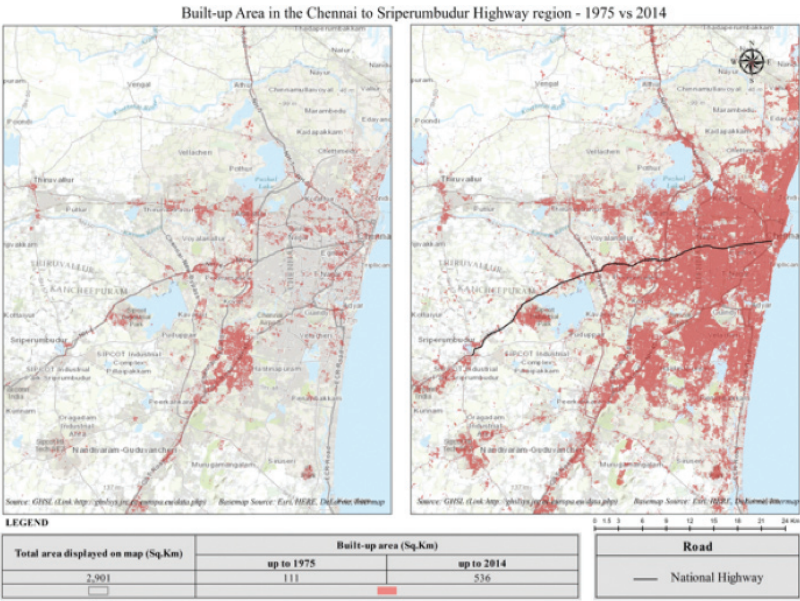
Satellite data reveals other trends as well. While one cannot establish causation, growth seems to follow transportation corridors. In 2006, the Centre for Policy Research in New Delhi was one of the first to highlight the phenomenon of “corridor” cities: “Agglomerations [that] are long and thin stretches along a transport artery, growing only at places without a definite pattern of core and periphery.” Much like Kozhikode, the map of Chennai below shows how built-up area growth spans multiple jurisdictions (often rural) without any mechanism to jointly provide basic services and infrastructure, even as the regions grow in size and density.

Why Does This Matter for Urban Infrastructure Financing?

India has failed to understand and anticipate the process of urbanisation. As brilliantly illustrated in Alain Bertaud’s 2018 book, *Order without Design*, cities are economies first. In most instances across the world, attempts to constrain a city’s form through master-planning have failed, especially where planning has not respected—or has completely ignored—the underlying drivers of growth. This causes several distortions, but the most relevant in this instance is that the country has lost control over the footprint, shape and size of its cities, which, in turn, has clear implications for infrastructure and sustainability.

At a minimum, it is likely that India’s current infrastructure requirements are being underestimated since the estimates exclude a vast amount of dense, built-up

Figure 4: Growth along the Chennai-Sriperumbudur Highway, 1975-2014

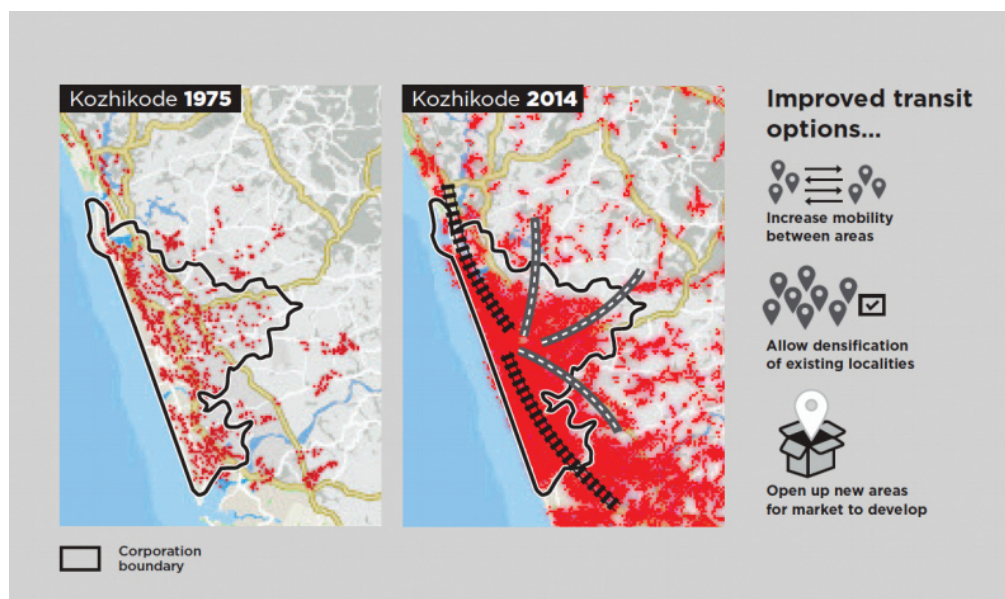


growth that should be provided with basic urban infrastructure and services.

More importantly, however, the country is locking itself into an unsustainable urban form that will be expensive and difficult to retrofit in the future. As the maps above show, there is little control over the footprint and spread of Indian cities. Indeed, a defining feature of peri-urban growth is that it tends to be a low-density sprawl. In Kozhikode, for instance, average density in the peri-urban built-up area fell by 7.2 percent per year between 2001 and 2014. In contrast, the world's better-planned cities encourage compact footprints, which allow for high-density living along mass public-transit lines. From a cost perspective, the further our cities spread, the more kilometres of road, metro lines and sewers must be built. From a sustainability perspective, research shows that dense urban areas have significantly lower carbon emissions than suburban areas. Edward Glaeser and Matthew Kahn's work shows that for almost every metropolitan area in the US, carbon emissions per capita are lower for those who live in the central city than for those who live in the suburbs.¹⁹ Manhattan, they calculate, is one of the greenest places in America, not only because smaller apartments require less electricity for heating and cooling, but also because of the compact urban form and a high share of public-transportation usage.

A Kozhikode resident who lives in the peri-urban area but works in the municipal area must traverse 4-metre roads to get to a 9-metre road. Such a trip would most likely take place by a bicycle, a motorbike or a small bus. As economic activity grows over time, this will lead to congestion and idling vehicles. Putting in mass public transport requires wider roads, which are only sparsely spread within the peri-urban areas. We are then locking ourselves into a situation in which the use of

Figure 5: Can Energy-Efficient Mass Public Transit Increase Mobility, while Keeping Emissions in Check?



mass transit would need to be limited in favour of private-vehicle use.

However, there is an alternative paradigm that uses strong, yet minimal planning to help address both infrastructure costs and concerns about sustainability.

Planning Ahead for Urban Growth: The 1811 Commissioner's Plan for New York City laid out a notional road grid for the city across what was then rural farmland, were it ever to extend past the congested southern tip. The city boomed, but because it had reserved the rights of way for a grid in advance, Manhattan now has an orderly grid of streets that can carry mass public transit, and trunk infrastructure and also facilitates walkability. To apply this approach in Kozhikode would require that we proactively recognise the urbanisation of the periphery, prepare a development plan for the region (including room for arterial roads) and invest in mass transit that knits the urbanising areas together and keeps long-term energy emissions in check.

Ahmedabad is one of the only Indian cities that has planned ahead for growth in this manner. It uses the town-planning mechanism to reorganise rural plots in the peri-urban region: the local administration identifies a block for development, takes an equal amount of land from each of the farmers (usually two-fifths of the total area) and then re-organises the plots so that land is returned in neater, more orderly parcels. The land thus acquired is marked for roads and underlying infrastructure e.g. sewers, and then built out gradually. The Atlas of Urban Expansion finds that roads widths in peri-urban Ahmedabad at 8.5 metre are wider than those in the city centre at 7.2 metres. Ahmedabad used a similar mechanism to create land

for a 76-kilometre ring road in the city, built in a record four years. This is in sharp contrast to the lengthy, expensive and often inequitable process of land acquisition used elsewhere in the country.

Planning and Transit as a Financing Mechanism: The planned urban expansion of Ahmedabad is largely self-financing. Both planning and transit can be used to help finance urban infrastructure. Most global cities such as Hong Kong and Singapore have their prime residential and retail property atop stations, which is then sold to reimburse the cost of building the transport infrastructure and, often, low-income housing as well. In most cities, the government can use mass transit infrastructure and a sensible FSI regime to open up land markets for housing and commercial development. The real difficulty lies in coordinating across different levels and agencies in the government and between rural and urban administrations. Aligning incentives may be the trickiest part of this process. For instance, there is tremendous potential for the Indian Railways to build both housing and retail directly over railways stations, particularly in cities like Mumbai, whose railways are its lifeline. There is an added benefit as well. Currently, the government spends significant sums of money building affordable housing; for cost reasons, these are often built in areas that are less easy to access. An alternative is to use the allocations under 'Housing for All' to build mass transit in rapidly urbanising cities and their peri-urban regions. A liberal FSI can incentivise the private sector to come in and provide a larger share of housing, with the government then filling in a smaller part of the gap.

Planning can improve the use of land monetisation tools, even in inner cities. Cities across the world use developer exactions or betterment levies—where developers or homeowners pay part of the cost of the infrastructure that serves their area—as a financing tool. In Shanghai and Bangkok, developers met all or part of the cost of construction and maintenance of pedestrian links or bridges from their commercial developments to the metro station. It is also critical to tie these exactions to a sensible planning regime.

For instance, in Mumbai, the municipality exploits a self-imposed artificial scarcity: a uniform FSI of 1.33 to fill its coffers. In recent years, this revenue, which is shared with the state government, has exceeded collections from property taxes.²⁰ However, this has not been reinvested in infrastructure in the specific area, nor has it led to an improvement in the overall urban fabric.

In contrast, Ahmedabad's local government seeks to address both these concerns via planning regulations. The 2013 Development Plan for Ahmedabad provides for a much higher FSI in the downtown area. When buildings redevelop, in addition to paying a development fee, the city must also make more efficient use of its plots. Specifically, the plan eliminates wasteful setbacks areas (typically land between the compound wall and the building footprint) and turns this land over to the municipal authorities to widen the road. The new building footprint abuts the street, with the ground floor recessed to provide the arcades and covered walkways seen in New York, London and the Fort and Ballard Estate areas of Mumbai.

Therefore, the conversation must move beyond how to raise the requisite amount of financing to how we can use planning to finance infrastructure and transform the fabric of Indian cities.

The Way Forward

The need to reform the management, planning, financing and governance of Indian cities is well established. In particular, the dovetailing of financing and planning will hinge on governance reform: streamlining the morass of overlapping jurisdictions, fostering coordination between levels of government, and building the autonomy and capacity of local governments to emerge as key players in India's urbanisation story. Mechanisms to strengthen coordination between rural and urban areas are critical, yet the metropolitan and district-planning committees meant to address this concern remain defunct. Higher levels of government, particularly the states, must recognise the need to devolve more resources and expertise to their growth centres. A new cadre of municipal and state officials are needed, who are trained not only in urban planning but also in urban economics. Indian cities need the equivalent of the New York City Economic Development Council that plans for and encourages growth.

Yet, none of this is possible without a political calculus that represents the urban voice. According to an estimation by Karthik Shashidhar, India has only 53 predominantly urban constituencies. This means urban areas account for about 9.7 percent of the total seats in Parliament even though 34 percent of the population lives in urban areas.²¹ If we used any of the alternate definitions of urbanisation, the number of urban or urban-like constituencies (and share of the population) would be much higher. However, until a city is officially recognised as urban, its political representatives are unlikely to understand that the area's requirements are urban instead of rural. Unfortunately, this under-representation looks set to continue. Constitutionally, electoral constituencies must be redrawn every 10 years to ensure proportional representation. However, the 42nd Constitutional Amendment Act, 1976 froze the number of seats and constituency boundaries until 2001. This meant that areas that experienced rapid urbanisation during this period were under-represented in Parliament. While boundaries were redrawn in 2001, the 84th amendment to the Constitution has frozen 2001 boundaries until 2026, by which time India's urbanisation will mostly be complete. The lack of political weight has clear implications. Under the 14th Finance Commission, urban bodies received approximately 30 percent of the total grant given to the third level of government. Panchayats received INR 200,292 crore, whereas municipalities received INR 87,143 crore.²²

For its cities to be vibrant powerhouses of the country's economy, India must first break down many of its older constructs and narratives and address the complexity of an urban future.

Endnotes

- 1 R. Dobbs, S. Smit, J. Remes, J. Manyika, C. Roxburgh and A. Restrepo, *Urban world: Mapping the economic power of cities* (McKinsey Global Institute, 2011).
- 2 P. Siffel, "This is why people live, work and stay in a growing city," *World Economic Forum*, 2018.
- 3 G. Duranton and D. Puga, "The growth of cities," *Handbook of Economic Growth* (Elsevier, 2013).
- 4 A. Bertaud, "Cities as labour markets," *NYU Marron Institute of Urban Management Working Paper Series*, Marron Institute of Urban Management, 2014.
- 5 S. Sankhe, I. Vittal, R. Dobbs, A. Mohan, A. Gulati, J. Ablett, S. Gupta, A. Kim, S. Paul, A. Sanghvi and G. Sethy. *India's urban awakening: Building inclusive cities, sustaining economic growth* (McKinsey Global Institute, 2010).
- 6 Economic Survey 2017–18.
- 7 P. Bhandari, *Slow Pace of Infrastructure Build-out-Concerns and Key Steps*, 2018.
- 8 There is sufficient anecdotal evidence for this.
- 9 Rationalising Charges: Indian Infrastructure, 2017.
- 10 S. Chattopadhyay, "Municipal Bond Market for Financing Urban Infrastructure," *Political and Economic Weekly* 41, no. 26 (2006).
- 11 "Pune Municipal bond lists on BSE," *The Hindu Business Line*, 2018.
- 12 HT Correspondent, "Pune's 24x7 water supply project: Rs.200 crore bond cash goes in FD," *Hindustan Times*, 2017.
- 13 S. Sankhe, I. Vittal, R. Dobbs, A. Mohan, et al., op. cit.
- 14 B. Patel, B. Nair, S. Ballaney, V. Pathak, V. Thawakar and C. Koshy, et al., *Inventory of Public Land in Ahmedabad*, Gujarat, India, 2013.
- 15 S. Sankhe, I. Vittal, R. Dobbs, A. Mohan, et al., op. cit.
- 16 P. Prakash, *Property Taxes across G20 countries: Can India Get it Right?* (CBGA, 2013).
- 17 Ibid.
- 18 S. Gandhi and V. Tandel, "Raising revenue from land-based financing," *Mint*, 2016.
- 19 E. Glaeser and M. Kahn, "The Greenness of Cities: Carbon Dioxide Emissions and Urban Development," NBER Working Paper Series, 2008.
- 20 S. Gandhi and V. Tandel, op. cit.
- 21 K. Shashidhar, "India has only 53 predominantly urban constituencies," *Livemint*, 2013.
- 22 Issues of Guidelines for the implementation of recommendation of the 14th Finance Commission, 2015, <http://mohua.gov.in/upload/uploadfiles/files/GuidelinesMinistryFinance14thFinance02.pdf>.

Moving from Growth to Development: Financing Green Investment in India

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The India we wish to build

The Indian economy is forecast to grow at 7 percent-8 percent in 2018-19, the fastest rate of growth amongst the G20 countries. India is still amongst the lowest quartile of nations in terms of per-capita income. People's quality of life is held back, amongst other things, by the country's inadequate infrastructure.

India's infrastructure challenge is different to that of most other G20 countries. Instead of an *infrastructure transition*, India's journey is one of *infrastructure creation*. It has the option to skip the growth trajectory adopted by so many other countries and move straight to an economy fit for the 21st century. The old model can be avoided—that of growth replacing: cheap labour with fossil fuels, a predominantly primary economy with low value manufacture, and services and rural agrarian development with an uncontrolled urban sprawl. India can move directly to the 21st-century paradigm of renewable energy sources, circular-economy materials flows, and high-density planned cities with mass-transport systems.

India's Nationally Determined Contribution (NDC)¹ includes pledges to reduce the emissions intensity of GDP by 33 percent-35 percent by 2030 below 2005 levels and to increase the share of non-fossil-based energy resources to 40 percent of installed electric power capacity by 2030, with help of transfer of technology and low-cost international finance. These are ambitious promises and are recognised by commentators as being broadly consistent with a 2°C world.²

In order to achieve them, India is setting out on a huge programme of investing in solar PV and wind with targets to have 175 GW of installed Renewable Energy (RE) capacity by 2022; this represents a 50-percent increase in India's current electricity generation capacity of 345 GW.³ India is also seeking to electrify its mass transportation system through completing the electrification of its broad gauge rail (16,500 km) by 2022,⁴ electrifying its vehicle stock between 2015 and 2017. The sale of Electric Vehicles (EVs) and hybrids saw an impressive seven-fold increase, rising from 10,321 vehicles in 2015 to 72,482 in 2017. E-rickshaws have grown to an estimated 1.5m. India has avoided setting targets for electrifying its vehicle fleet; many other countries have done so and it is likely that global car manufacturers will shift their R&D and manufacturing plants away from petrol and diesel drive trains.

According to official data, 1,417 of India's 18,452 villages, or 7.3 percent of the total, have 100 percent household connectivity, but about 31 million homes are still without light in the evenings. Agriculture's contribution to India's GDP is only 17 percent, yet it provides the livelihood of more than 40 percent of India's 1.3-billion population. The ever-increasing demand for food has put productivity pressure on agriculture, leading to increased mechanisation and increasing its dependence on an increased supply of energy. Agriculture and other land-use projects could greatly benefit from investment in newer capital-intensive technologies like drip-irrigation, farm-level anaerobic digestion of manures and crop waste, other improved water management technologies.

To date, climate policy action including financing has remained heavily tilted towards mitigation. Given the certainty of extreme weather events rising in frequency and intensity, a high degree of vulnerability and low adaptive capacity of communities, it becomes absolutely central to climate-proof the economy and strengthen peoples' capacities to withstand climate shocks to their lives. Out of 170 countries surveyed India has the 2nd highest vulnerability to climate change.⁵ According to the Economic Survey's mid-year report (2017), the direct costs of extreme events spurred by climate change in India are in the tune of US\$ 9-10 billion per annum.⁶ Building in adaptation and resilience cover for vulnerable areas/sectors thus becomes critical to creating financing flows for identified assets.

The scale of finance required

Building climate-responsive infrastructure at this scale and speed is an unprecedented challenge. There have been a range of different short and medium-term assessments made about the investment needed. A few of these are given below to show the relative magnitudes. These estimates are largely based on investing in more of the same sorts of infrastructure that have been built already.

According to the High-Powered Expert Committee appointed by the Ministry of Housing and Urban Affairs, about US\$ 550bn (INR 39 lakh crore at 2009-10 prices) is required for creation of urban infrastructure over the next 20 years. Out of this, about 44 per cent was needed for roads and 20 per cent for services such as water supply, sewerage, solid waste management and storm water drains.⁷ This

excludes investment in infrastructure that services the cities need like electricity grids and generation which is outside the city, or buildings which are funded by private developers. The Housing for All by 2022 programme aims to construct 20 million houses in 7 years with a subsidy of US\$ 1500 per house to cover slum clearance expenditures and US\$ 3400 per house (net present value) for lower income focusing on 1049 towns and cities.

The Government of India has estimated that US\$ 4.5 trillion is needed to meet India's ambitious targets for renewable energy and urban sustainability over the next ten years – around US\$ 450 million per year.⁸

But a truly sustainable infrastructure investment strategy would need to include costs of decarbonised transport systems as an alternative to private cars like metro lines, broad gauge railways and energy efficient buildings. In China, which has rolled out metro lines at the rate India might seek to, the costs of construction varied between 700 and 1200 million yuan per kilometre (US\$105-180 million/km). If India set out to develop 1000 km of new Metro (equivalent to three more Delhi scale systems) costs could easily be US\$105-180 billion.

The total budget of the central government is US\$ 383 billion. As can be seen, the magnitude of the planned investment programme is already a high proportion of total government revenues. While these costs are massive, the net increase in jobs because of adoption of sustainable practices, including a change in the energy mix, the projected use of electric vehicles, and energy efficient buildings will be 2.8 million.⁹ “Bold climate action [by the world] can deliver US\$ 26 trillion in economic benefits through 2030 (compared with business-as-usual growth path) and generate 65 million jobs.”¹⁰

India's transition needs stand at US\$ 2.3 trillion in climate action through 2030. Such a transformation of India's economy will need a mixture of local resources raised through user charges, successful tax collection and domestic savings, particularly from pension funds and insurance. The other source is the international capital market. This will mean fundamental shifts in how the financial system organises itself to integrate risks comprehensively and allocate capital effectively.

Long-term investment is a fundamental requirement in greening infrastructure. The world saves US\$ 20 trillion annually and nearly US\$ 28 trillion of these savings are parked with OECD pension funds alone.¹¹ Bonds as a financial instrument are particularly well suited to access this financing as they match the scale, long tenor and low risk requirements of these institutional investors.

Bonds also represent a large share of global financial flows with around US\$100 trillion outstanding globally. The majority of these (around 75 percent) are issued in developed countries – mainly the United States (40 percent).¹² A natural destination for these funds, reliably suited for the long term low carbon and climate resilient infrastructure, should be emerging economies like India where they could earn up to three times the return than they currently do at 2 percent. However, the current allocation is vastly suboptimal.

To attract capital at scale, the risk perception (and hence the higher cost of capital) around low-carbon investments relative to other projects will need to be lower. With every new Green Bond issuance, this hurdle becomes a tad easier to cross as the market becomes more comfortable with the technologies and the project stability of these investments over the long term is better established.

Domestic sources of financing green infrastructure

India's large pool of domestic savings (30 percent of India's GDP) are predominantly locked up in physical assets and not open to financial intermediation.¹³ Of the household financial savings, more than half are in the form of bank deposits which are short-term and do not match the investment criteria for infrastructure projects which are typically high risk, have large upfront capital costs and pay returns after a long gestation period.

Traditionally, commercial banks and Non-Banking Finance Companies have funded infrastructure projects making up 40 percent of the country's total infrastructure finance and 80 percent of the total debt infrastructure finance in India. The lingering non-performing asset troubles of the banking industry, however, are likely to constrain this source severely in the future. Additionally, banks face an asset-liability mismatch (ALM) when they finance long-term infrastructure loans through deposits of shorter maturity.¹⁴

The banking regulator, the Reserve Bank of India, has issued regulations and guidelines to define directed lending to specified sectors and influence interest rates, exposure limits, security and other conditions for lending by banks.¹⁵ Priority sector lending, for example, ties 40 percent of aggregate bank credit to sectors including agriculture, energy and Micro, Small & Medium Enterprises (MSMEs). Priority Sector Lending could play an important role in channeling green finance but has proved to be largely inadequate and ineffective, calling for a systematic review to make it fit for purpose. Because RE is within the energy sector, for example, existing bank loans towards coal plants has restricted lending to the RE sector to avoid over-exposure to energy assets.

Among the capital market instruments, green bonds offer an opportunity to relieve pressure on bank balance sheets. They are fixed income securities whose proceeds go specifically to low carbon climate resilient projects. While US\$ 7.15 billion raised by diverse issuers in two and half years might look meagre in the face of the investment needs, it is positive. With further growth of the domestic renewable energy market and an awareness around the opportunities in other sectors, the associated risk perception is expected to fall. The recent announcement by the pensions regulator to reduce the minimum credit rating for Indian pension funds from "AA" to "A" is a welcome step and will open up a huge market. Also, the market regulator, Securities and Exchange Board of India's (SEBI) new framework requires large companies (outstanding borrowing of INR 1 billion and with AA Rating or higher) to raise a fourth of their debt requirement via bonds.¹⁶

Developing this market also has the potential to address the larger financial

challenge. Indian bond markets are not deep (comprise five percent of GDP) and listings of Indian bonds on global financial markets tend to face exchange rate risk which hinders investors' appetite. Inflation targeting along with other Reserve Bank measures can serve to lower volatility in the exchange markets—allowing India to calibrate its exchange rate depreciation to its stable current account deficit. Given these conditions, bonds become attractive to international investors at inflation-adjusted returns of up to 4 per cent.¹⁷ Masala Bonds also have been a helpful innovation and large players like IREDA and NTPC have tapped this channel to issue green bonds.

State of the Indian Green Bonds Market and opportunities to scale

The Indian green bond market had its first green issuance three and a half years ago and 20 green issuances have happened since. By November 2018, the total green bond issuance reached US\$ 7.15 billion making it the 12th biggest issuer in the world by dint of the size of the Indian economy¹⁸ and the sophistication of its financial sector.

Issuing institutions have included non-financial corporates like Greenko, private banks like Yes Bank and also public sector backed entities like IREDA, and the Indian Railway Finance Corporation. The growth in issuance of the green bond market can be seen in Figure 1. 2018 has been relatively flat in terms of growth mainly due to tight market conditions. The major issuer in 2018, the State Bank of India, increased its issuance by US\$ 150 million to a total of US\$ 650 million. It is set to issue on a repeat basis like many others in the leading club of issuers.

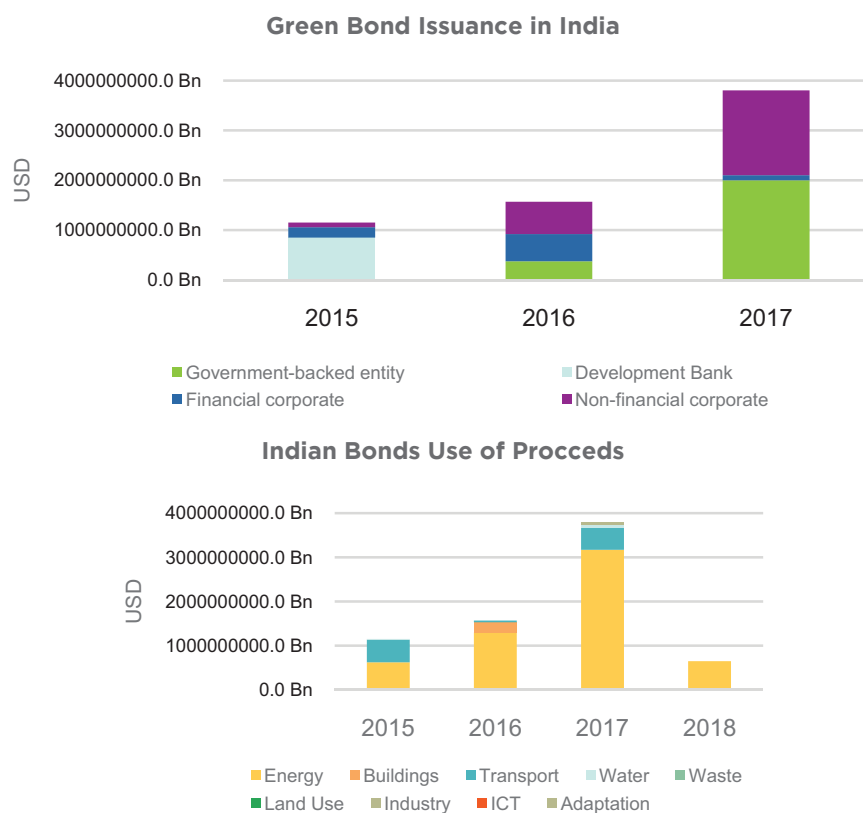
All green bonds have been oversubscribed and have attracted a wider pool of investors than vanilla equivalents by the same issuer. Additionally, greater investor diversification has also led to a pricing advantage - albeit a mathematically conclusive result establishing this assessment is not available mainly due to limited availability of data. However, anecdotal estimates suggest that pricing advantage for Indian issuers has been between 7 to 14 basis points. The experience of the first issuer of Green Bonds, the European Investment Bank shows that its green bonds trade much tighter than an equivalent non-green bond, giving support to the argument about a pricing advantage on green bonds.

The latest report on Green Bonds Pricing in the Primary Market (analysis done for US\$ and EUR denominated bonds for January to June 2018) suggests that the spread compression was 8 basis points (bp) for green bonds as against 7 bp for vanilla in EUR and 18bp as against 14 bp for US\$ denominated green bonds lending.ⁱ Even though the gains are currently narrow, they are encouraging.

Additionally, performance in the immediate secondary market showed that 62 percent of green bonds tightened more than comparable bonds seven days after

i For details and methodology, please refer to https://www.climatebonds.net/files/reports/cbi_pricing_h1_2018_011.pdf

Figure 1: Green Bond issuance in India 2015-Q3 2018



pricing and 90 percent had tightened more than their comparable index. After 28 days, this changed to 59 percent for comparable bonds and 66 percent for comparable index.

Bond proceeds have been used to finance utility scale renewables, energy efficient buildings and large-scale transport infrastructure. These bonds were issued as senior, investment grade debt with credit-ratings usually based on the rating of the issuing organisation. Issuances by ReNew Power and Porbandar Solar Power (which issued climate-aligned bonds)ⁱⁱ benefitted from a guarantee from state-owned India Infrastructure Finance Company Limited.

The deals show that credit support can make bond investments from smaller corporates attractive to risk-averse institutional investors. Such credit enhancement could mobilise India's sizeable domestic savings for infrastructure projects, facilitating market access for the private sector and lengthening bond tenors.

As yet, only a narrow range of asset types have been financed through green

ⁱⁱ Climate aligned bonds are not labelled as green but their proceeds go to projects that have positive climate impacts. Analysis of global issuances for 2018 shows that the universe of climate aligned bonds is USD 1.45 trillion of which labelled green bonds comprise USD 389 billion. (<https://www.climatebonds.net/resources/reports/bonds-and-climate-change-state-market-2018>)

bonds: renewables have accounted for over 80 percent of issuance. Agriculture and land-use still have substantial unmet investment needs. Green bond issuance so far has not benefitted households and MSMEs.

Adaptation and resilience bonds as an asset class present a huge opportunity and need in the Indian market. Institutions like the National Bank for Agriculture and Rural Development and projects like the Zero Budget Natural Farming run by the Andhra Pradesh Government are exploring the possibility of issuing such bonds. To help kickstart this market, Climate Bonds Initiative and the World Resources Institute are developing criteria to help bring to market high-quality issuances in this category.

Asset backed securitised (ABS) deals have a strong case (covered later in the paper) for an uptake and add to the diversification of green bonds into sectors as varied as off-grid RE systems, agriculture, housing and electric vehicles (EV). Affordable green housing is a market of no less than US\$ 1 trillion and the EV's project an investment of US\$ 667 billion. A Crisil assessment suggests that power, transport and urbanisation will corner nearly 78 percent of infrastructure investments.¹⁹

This also means that private-sector participation has to ramp up considerably. It has been limited by lack of banking credit available for long-term projects on the one hand, and the lack of institutional capacities to mitigate or manage risk on the other.²⁰ Importantly, private sector participation is also linked to the challenge of structural and governance reform. The government has focused on revitalising Power Purchase Agreements and other reforms (single window clearance) to encourage greater participation of the private sector.

Additionally, while the demand from international investors clearly exists, a major challenge has been to deliver the deal pipeline. Having credible pipelines across sectors is not merely a function of the market players but also requires systemic policy and market interventions.

Another hurdle in developing this market at scale is the pervasive lack of awareness among borrowers, financiers, and even policy makers and regulators regarding the opportunities presented by climate bonds. The opportunities for investment that exist in India for such investment need to be made more visible domestically and internationally.

To regularise bond issuances, SEBI issued its “Disclosure Requirements for Issuance and Listing of Green Debt Securities” in May 2017. These are a progressive and necessary step but not sufficient on its own to drive the market. The guidelines are largely in line with international standards - the ICMA Green Bond Principles and the Climate Bonds Initiatives Taxonomy. SEBI's document also includes an indicative list.ⁱⁱⁱ A key problem is that there is no detailed taxonomy, so issuers have

iii They provide details about the process issuers must follow to issue a green bond: define which of eight broad categories funds will be spent; specified disclosures including environmental objective, decision making to decide project eligibility, procedures for tracking fund allocation, and annual monitoring of spending of funds.

scope to define green for themselves. The growth of green bonds will also depend upon innovative combination with other financial structures to drive down the cost of capital for it to be widely accessible for Indian issuers.

Harnessing international debt capital market at an affordable price

The international capital market invests US\$1-2 trillion per year; it is at the scale and has the long-term nature needed for India's infrastructure investment. How then should India access international capital markets cheaply? International investors are prepared to accept historically low returns - US Treasury bonds return a yield of 2.87 percent at the time of writing. Cost of debt in India has also fallen albeit not to the level of US Treasury Bonds. The Indian government provides investors in 10-year Indian Government Sector Bonds a yield of 7.5 percent.

There is a similar story for green bonds. India's green bonds pay coupons in the range of 2.75 percent-6 percent for a USD denominated issuance, and the range of 7.38 percent -10.75 for an INR denominated issuance, depending upon whether the issuer is a government entity or a renewable company company.

Why is an Indian renewable energy project bond paying in Indian Rupees cost four times than a bond from the US Government paying in American Dollars? It is because lenders do not decide the rate of interest to charge on the ethical benefits of the investment. Their risk models are based on the cold logic of the bond issuer's ability to reliably pay the coupon on schedule, and the capital to be returned as the terms of the bond call for. In this risk model, the Indian Rupee corporate bond pays a triple penalty - higher rates to compete with India's high Government Sector bonds, high costs of issuing in INR because of a volatile and depreciating currency that is expensive to hedge, and the low liquidity of the bond market as a result of thin volumes traded in India's secondary markets.

Blended finance can reduce the costs of private capital and increase the volume of lending

There are several important risk factors that increase the cost of other forms of international finance, besides bonds. The aforementioned currency risk affects all forms of international finance - although it can be mitigated by hedging with currency swaps, given the Indian Rupees traditional stability with respect to the Dollar. There are also various commercial and technical risks: Indian power utilities have sometimes been slow to pay merchant generators monies, for example. The latter factors can be mitigated by the public finance taking a subordinate tranche to the private finance - a mechanism that is known as "Blended Finance". Such instruments can improve the credit rating of the bond one or two notches making an otherwise unattractive bond attractive to risk averse investors.

Development aid finance is used to mitigate the real and perceived risks of repayment, thus lowering the overall cost of capital. This blending of private and public finance leverages far larger flow of capital than could be achieved by concessional finance

Figure 2: Financial instruments to mitigate project risks

INSTRUMENTS	RISK									
	MACRO		CREDIT / COMMERCIAL			TECHNICAL		FINANCE	INFRA SPECIFIC	
	Political/ country risk	Currency risk	Credit risk	Liquidity risk	Demand risk	Corruption risk	Operation risk	Access is capital	Lack of pipetions	Off-shore risk
1. Guarantees										
2. Insurance										
3. Hedging										
4. Junior/ subordinated cap										
5. Securitization										
6. Contractual mechanisms										
7. Results-based incentives										
8. Grants										

Source: Better Finance

alone. A recent report on blended finance runs through different models for using concessional finance to reduce the private sector's exposure to risks. These are shown in Figure 2.

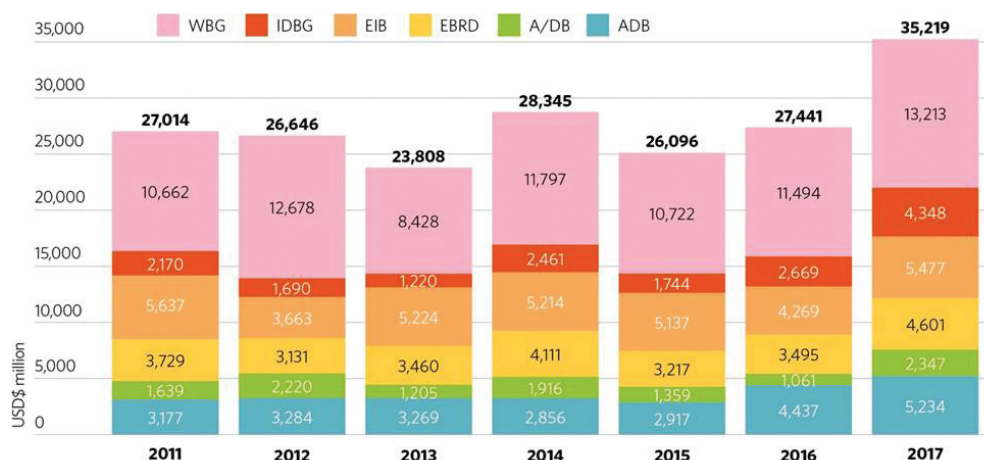
Sources of concessionary finance

The main multilateral sources of finance to fund green infrastructure are multilateral development banks (MDBs), development aid budgets from OECD countries and China and the climate finance initiatives that arose from the UN-Climate Change Convention (UN-FCCC).

MDBs have been substantial investors in energy infrastructure for decades. Historically their focus has been through an economic development rather than climate change lens. This has changed recently, however, and renewables and energy efficiency rather than fossil fuels now make up the lion's share of their disbursements. In 2017, spending on climate finance from the major development banks was US\$35 billion, an increase of US\$8 billion compared to 2016.

Of the MDBs whose geographic focus includes India, the World Bank Group's IFC is the largest source of climate funds (around US\$13 billion), followed by the Asia Development Bank (US\$5.2 billion loans including lending on commercial and non-commercial terms). While the recently established Asia Infrastructure Investment Bank and the BRIC's New Development Bank are still in the process of scaling up their lending, their criteria are broadly similar to the older regional development banks.

Figure 3: Total reported MDB climate finance commitment 2011-17 (in US\$ million)



Source: Joint Report on Multilateral Development Banks' Climate Finance

Blended finance by the MDBs and national development banks

Recognising the scale of investment needed to green emerging economies, a shift in philosophy is taking place within MDBs to make more efficient use of their balance sheets. Instead of offering direct loans the MDBs are increasingly being asked to use their balance sheets for the credit enhancement of private sector loans. MDBs reported private finance mobilisation in 2015 of US\$ 10.9 billion which increased by 43 per cent the following year to US\$ 15.7 billion²¹. A report issued by Milken and OECD foundation examined the use of credit enhancement to leverage private sector capital to amplify the size of investment²². In the four-year period between 2012 and 2015, the most common tools used were guarantees, syndicated loans and credit lines which together mobilised US\$81 billion of private finance.

The extent to which blended finance is used by MDBs varies. The World Bank Group's MIGA is focused on using blended finance, the IFC has established a blended climate finance team which uses a mixture of concessional finance instruments (i.e. soft loans, equity, guarantees) to undertake pioneering projects that directly combat climate change and have a strong potential to transform markets. Other MDBs make limited use.

Examples of successful blended finance projects include IFC's Managed Co-Lending Program for infrastructure where three third party institutional investors together invested US\$1.5 billion. The 10 percent first-loss tranche is supported by guarantees by the Swedish International Development Cooperation Agency. The infrastructure fund itself is managed by IFC. Meanwhile, the EBRD has provided €89 million interim liquidity facility to support the €288 million euro-denominated Elazig hospital bond in Turkey.²³

UN-FCCC finance mechanisms: Under the UN-FCCC's 1997 Kyoto Protocol, legally binding mitigation targets were set for developed economies. During negotiations for successor agreements like the Paris Agreement targets have also been adopted by developing economies on the same voluntary basis as the developed economies. This was accompanied with the creation of “climate finance” mechanisms to help developing economies finance the mitigation of and adaptation to climate change as their economies develop.

The climate finance mechanisms agreed under the Paris Agreement are implemented by the Global Environment Facility and the Green Climate Fund. The GCF is responsible for financing mitigation, adaptation and REDD projects. It is the main mechanism for co-financing India's efforts to develop mitigation infrastructure under the UN-FCCC. So far, the fund has received pledges from donors of US\$10.2 billion, receipts of US\$7 billion and committed to disburse US\$4.8 billion to around 100 projects. In India, alongside Tata Cleantech Capital and private sector developers, it has co-financed a US\$250 million project to offer a line of credit for rooftop solar; the aim is to finance 250 MW of new solar²⁴.

It seems unlikely that the UN-FCCC funds will reach the size to move the dial on India's overall infrastructure spending. They can, however, play an important role in financing pure-play resilience projects, which do not generate a tangible income stream and are thus unable to attract private finance.

In the most recent Biennial assessment by the UN-FCCC²⁵ funding through the climate change funds rose from US\$1.4 billion in 2015 to US\$ 2.4 billion in 2016; those from the multilateral development banks (MDBs) rose from US\$23.4 billion to US\$25.5 billion. These figures refer to disbursements *spent in all developing countries* not just India. India and other G77 countries should continue to press for an expansion in resources the developed world feeds into climate finance, but there is recognition that grants and concessional finance can only ever provide a small proportion of the resources needed.

India has also graduated from its low-income status and is now a lower middle-income country according to World Bank classification, which means that priority for and terms of concessional lending from the World Bank will change. Thus, market-based finance will need to be aggressively accessed.

The state of play of green bonds market is thus as much about the increase in issuances as it is about readying the support system that enables it.

Activating the drivers for scaling up green issuances in India

Green Bonds are fundamentally oriented towards large volume deals (greater than US\$ 100 million in international issuance and US\$ 50 million in domestic issuance). The greening of India's economy, however, needs to be assessed through both the high-volume individual deals (utility scale RE, Rail or metro transport etc) as well as aggregating large number of smaller assets and making them attractive for market investments.

In combination with other sources of capital like mainstream lending or alternative financing instruments like blended finance, green bonds' with their taxonomy (various science backed voluntary frameworks in use globally), simplicity of structure and attractiveness to 'green investors' can steer access to long term cheap capital.

In the next three to five years, following enablers can help achieve wider familiarity and use of green bonds:

Green Securitisation

Securitisation, the process of transforming a pool of financial assets (for example, mortgages or lease receivables) into tradable financial instruments, has great potential to mobilise institutional capital at scale. A securitisation can be defined as 'green' when cash flows backing it come from low-carbon assets. The introduction of a tax reprieve for unlisted debt securities and new rules in favour of foreign investment into the sector have given a fillip to securitisation in India. Financial institutions are issuing a range of securitised instruments that typically involve the pooling of small loans to farmers, small businesses, mortgages and car loans. Overall, the volume of securitised deals in 2017 stood at US\$ 7.4 billion, and has been showing an upward movement despite a shallow bond market.

This avenue of market borrowing in the light of worsening credit by banks to the MSMEs, has the potential to make finance more accessible to small borrowers, especially as the Non Banking Financial Companies (NBFCs) are able to shift loans off their balance sheets and facilitate greater lending to farmers and small businesses. That the NBFC lending to the MSME sector has also been growing at an annual rate of 35 percent is a reassuring and stable trend that can prove to be an effective way for capital flows to climate smart activities.

Green securitisation's benefits include meeting priority sector lending targets,^{iv} helping match investors' liabilities with asset tenors as investors of ABS include pension and insurance companies with long-dated liabilities, cheaper finance by aggregated loans to a scale they can be refinanced; providing higher yielding investments by creating equity and mezzanine tranches in the process of securitisation, and managing exposure limits under credit.

One of the main channels for making this capital available are the Micro Finance Institutions (NBFC-MFIs). The MFI sector (including loans from banks and small finance banks) have a cumulative portfolio of INR 1.23 lakh crore. MFIs have been using the securitisation route and in fact have been helping banks meet their priority sector lending targets. Even though this is the case, MFIs themselves have not been explicitly geared towards climate change oriented financing. Hence a lot of areas

iv In India the major driver for securitisation have been bank Priority Sector Lending (PSL) targets. RBI mandates banks to lend at least 40 percent of their Adjusted Net Bank Credit to specific sectors: agriculture; education; export credit; housing; micro, small and medium enterprises (MSMEs); renewable energy; social infrastructure; and others. Agriculture and micro-enterprises have further sub-targets.

that MFIs could tap remain unexplored. Deploying clean energy innovations, for example, in the rural sector alone presents a US\$ 50 billion opportunity²⁶. Energy efficiency, decentralised renewable energy systems; low income green housing, a range of other water-related efforts, including recycling and technologies to reduce use, drip irrigation and various climate-proofing products, such as improved roofing and insulation are a ready candidate for green securitisation.

Currently, most of the financing options, especially in rural and agricultural financing are in the form of short-term value chain finance, either internally between buyers, traders and sellers or from financial institutions to one or more of the most secure value chain enterprises or companies. This does not provide an adequate avenue to finance investments, especially ones of a longer-term nature. The use of green ABS for refinancing asset classes that are already familiar to the market is an attractive way of introducing green ABS into the market in a relatively low risk way for several different asset classes. Green ABS can thus help diversify the Indian green bond market and enlarge the scope of green financing as a whole.^v

Green tagging of assets and building project pipelines

The lack of credible project pipelines is a clear and present bottleneck to scaling up. It thus needs no emphasis that increasing the visibility of assets that lend to green/sustainability criteria which will help attract investors. That is true across all sectors.

One way to increase visibility is to develop green tagging tools for different sectors to identify assets and their climate impact. Green tagging is also needed for identifying green loans in the books of financial institutions to help structure green securitisation. It can prove to be an effective supply-side measure to match future demand.

Market players, research institutions and, government agencies will need to collaborate for data and criteria development, and for wide adoption of these tools. Governments at the federal and state levels can use this to tag green allocations in budget outlays as well as embed it in the design of state investment plans for climate change mitigation and adaption. The first steps in this direction are under way to develop a tagging tool for the agricultural sector.

Back labelling of bonds as green and creation of green funds

Existing bonds from large issuers can also be labelled as green if they fit the criteria. For example, Indian Railway Finance Corporation, which is a bond market regular that issued its first green bond in December 2017 can label its existing

^v OECD predicts that by 2035, nearly 44 percent of global volume of green bonds would be asset base securities (ABS) currently occupying only six percent of the market share, which mean that the market of green ABS will need to grow quickly to be 45 times larger in annual issuance by 2035. This initial assessment indicates that a large portion of investments will be made by relatively small and a large number of project developers. This has implications for how bonds could be used to fulfill these needs, particularly for households and SMEs.

eligible bond portfolio as green. This can immediately infuse 'green' liquidity into the market paving the way for more green issuances.

Domestic retail savings are an attractive, untapped pool that can be mobilised for green. Mutual fund industry players can create dedicated green funds in their portfolio to help move retail savings to green investment. They can also channel them to platforms like green Alternate Investment Funds like the one being planned to be floated by IREDA. The fund will invest in debt securities (issued by developers) backed by cash-flows of operational projects. It will be a vehicle to shift debt financing in clean energy from loan financing to capital markets with a target return of 8 percent.

Need for a national climate investment strategy

In tandem with the bottom-up market drivers discussed above, India now needs to push the policy lever up another notch to pace up the flow of green finance at scale and better manage real and perceived risks, insufficient returns on investment, capacity and information gaps. Green bonds, in particular, need to be seen in conjunction with other instruments as an effective means to shift capital at scale to priority sectors, and as an opportunistic means to inject transparency, scrutiny and new liquidity into the Indian bond market.

While there has been a consistent demand for a progressive domestic framework on taxonomies and climate related disclosure for financial institutions, which is in sync with the international norm, some existing instruments which could promise a good basis to take things forward have either not found their institutional home or have been side-lined at the behest of another 'priority.'

The case of the Responsible Finance Guidelines which were developed through a process of consultation with market participants by the Indian Banking Association in 2015 is illustrative²⁷. These guidelines went into cold storage when the RBI announced its plans to come up with a green finance strategy around the same time. It is however yet to publish a draft. The idea of the regulatory nudge by the RBI is touted by all market participants as necessary but the central bank itself has been rather passive in engaging with the topic of climate risk to financial stability and as a source of additional finance.

Measures such as the Clean Environment Cess (taxing coal) for environmental purposes were phased out in 2017, and subsumed under the introduction of the centralised Goods and Services Tax. India does not have a national carbon tax or emissions trading scheme, nor are any schemes planned. Last five years or so have seen a series of incentives being tabled for deepening and widening the green bonds and green finance markets in India. Almost all of them have been voiced in several dialogues with little attendant policy action.

The government needs to elucidate the link between growth, low carbon and climate-resilient models, and the scale and nature of the shift required, and design the financial pathways to achieve optimal outcomes.

A high-priority task, is thus, for the Government of India, to anchor a clear national climate investment strategy with a long term economy wide view. It will help recognise the preparedness levels of different sectors and decide on the right mix of capital instruments to be deployed. It should be used to minimise the mounting hidden costs due to mis-pricing of climate risks and externalities, introducing standards and definitional criteria for green finance, coordinating regulatory action, proactively empowering the states for realigning capital raising plans in sync with climate and SDG targets. Such a strategy must include a recognition of the fiscal and non-fiscal incentives structures for sectors that need support.

Engaging with international policy drivers for domestic and global leverage

As a result of high-level declarations by the G20 and the Financial Stability Board, a plethora of policy initiatives are being coordinated to green private finance. Engaging with these will enhance the country's credibility with international investors especially those with ESG mandates. India can also help shape the agenda and ensure the interests of a lower income country are fully articulated, the economic advances being made by the country are recognised, and sustainable investment opportunities are amplified.

India presents the largest RE (and other green investment) opportunities among emerging economies that follow market principle²⁸. Her active engagement in international policy processes is thus not only desirable but also necessary. More importantly, engagement will help re-orientate the domestic investment community to the climate agenda focusing its attention on the risks of stranded assets and ensuring that that investments in climate infrastructure are cognisant of a range of climatic change scenarios.

The purpose of the international initiatives is to protect financial systems from the sorts of disruptions wrought on the world economy by the financial crisis in 2008 through ensuring the finance sector manages climate risks and avoids abrupt changes in asset values ("stranding" of assets) through climate mitigation policy and damages through climate change itself.

The influential Task Force on Climate-related Financial Disclosures (TCFD) calls for firms to disclose exposure to physical risks from climate change (assets at risk from extreme weather, sea-level rise, drought), financial risks from policies to mitigate climate change such as stranded assets (less effort has been put into TCFD's identification of litigation risk). Financial institutions are also asked to strategically engage with these issues disclosing their exposure to outside stakeholders and establishing internal procedures for board level oversight.

India has not initiated any formal engagement with TCFD yet while regulators in many countries and regions like the EU are beginning to implement TCFD recommendations. Currently their approach is to encourage voluntary participation but over time it is expected regulations will harden and firms will become more directed. This is because the current voluntary approach produces analyses that

cannot be easily compared, and does not ensure efforts are ambitious enough to meet policy needs.

Three important initiatives are given below.

G20 Green Finance Study Group: It produced several well-regarded diagnosis of why the finance sector disregards or undermines the environment. This built on earlier work that China has done through its China Green Finance Committee.

Central banks and supervisors Network for Green Financial Systems: This is a group of 18 central banks, supervisors and 5 international organisations that are working together, on a voluntary basis. Its work includes: presentation of climate-related physical risk indicators, assessing exposure to banks, monitoring returns on equity, stress test on banks and insurance companies balance sheets and analysis of financial institutions' vulnerability to transition risks.

Harmonisation of the definition of green: the EU and China are taking a lead in implementing policies to green the financial sector. This is still at the proposal stage in the EU and includes a unified EU classification system ("taxonomy") to determine which economic activities are environmentally sustainable. The Chinese authorities recently unified their two different green standards (defined by the People's Bank of China and the National Reform and Development Council). Interestingly the ASEAN countries have also collectively defined a standard of "green" investment that altogether excludes fossil fuels.

Recommendations

This paper argues that India could leap-frog the growth paradigms adopted by many other countries by directing investment to solve its carbon emissions, equity and climate impacts challenges. The finance will need to come from a combination of domestic and international sources. Offshore issuances, aided by the MDBs could provide a huge learning experience, to structure issuances. It is important to make policy changes to incentivise investment in green technologies.

The recommendations below should set the direction.

Establish a "green" taxonomy: The SEBI disclosure requirements for green bonds and securities is a valuable first step in helping India define long-term sustainable investments and mobilising green finance, but it does not go far enough. The next step must be to establish a comprehensive set of criteria for defining "green" assets in sync with international frameworks. This would meet an urgent market demand for definitional consistency, standardisation, and comparability important for issuers, investors and appropriate public policy interventions

Formulate a national green investment strategy: The government should set out a "green" investment programme in consultation with the states and the private sector defining its vision, direction and priorities for investment in both mitigation and adaptation efforts. This should necessarily include levels of preparedness of

different sectors to determine the right mix of capital source, smart time bound incentive structures and institutional ownership and strategies to build bankable pipeline.

Review and redesign Priority Sector Lending to introduce green sub sectors with targets: Banks have a special role to play in primary lending to households and businesses. Priority Sector Lending sub-targets should be set on the basis of green taxonomy. This recommendation will help track and motivate financial flows into the green economy but other measures will be needed to kick-start bank lending.

Implement governance and structural reforms to attract greater private sector financing: This measure is required in multiple areas ranging from public procurement to land acquisition and tax administration. Any set of incentives could turn ineffective without addressing the root causes of risks, in effect keeping the private sector participation lower than optimal.

Drive down the cost of capital by increasing the supply of bridging structures: Systematically use MDBs and domestic credit enhancement structures like the IIFCL and IREDA to increase the credit rating and lower the cost of capital to up the deal flow of issuances. Resolution of cost and regulatory hurdles in accessing this facility should be taken up on priority.

Use the ABS to broaden the green bond market: Green bonds have typically been used to fund large companies, backed by the companies' balance sheets. Asset Backed Securitisation allows funding for assets secured on the strength of the cash flows earned by the assets themselves, and independent of the credit scores of the borrower. This opens up capital markets to mortgages, vehicle loans, agricultural and distributed renewable energy assets that have reliable income flows. ABS deals have grown despite a shallow bond market and the segment presents opportunities for green issuances to diversify into new sectors.

Further increase pension and insurance companies' investment in green bonds: Government has signaled its desire for corporates to increase share of funding from debt capital markets by issuing bonds. There has been some relaxation by the pensions regulator in the minimum credit rating allowed for bonds. It needs to follow through by further loosening constraints on domestic savings being invested in the real economy, subject to appropriate risk mitigation products being used.

Proactively engage with international policy dialogues and markets: It is not only important to do so to adequately project the opportunities that exist in India but also to emphasise on the changes required vis-à-vis the investor outlook and international country risk-rating systems.

Enable cities and sub-national government: Cities are responsible for establishing the framework for delivery of much of the green infrastructure - waste collection and resource recovery, water and sewerage, intra-urban transport and housing. There is a need to depoliticise the delivery, and ensure that competent bodies build

and operate the infrastructure. There is also a need to ensure user charges and local taxes can pay the debt service costs. Models like Hong Kong's MTR system show how an integrated "Property + Rail" can be operated to invest surpluses from increases in values of property near to subway stations to finance the construction of the investment.

Endnotes

- 1 Government of India, *India's Intended Nationally Determined Contribution*, October 2015
- 2 "India - Current Policy Projections", Climate Action Tracker
- 3 India Brand Equity Foundation, "Power Sector Growth", October 2018
- 4 Press Information Bureau - Government of India, "100% Electrification of Broad Gauge Routes of Indian Railways", News release, September 12, 2018
- 5 Verisk Maplecroft, "Risk Calculators and Dashboards", 2018
- 6 Mohan, Vishwa, "Climate Change Costs India \$10 Billion Every Year: Government - Times of India", The Times of India, August 18, 2017
- 7 Government of India, Ministry of Finance, *Economic Survey of India 2017-2018*
- 8 NewIndianXpress, "Infrastructure Investment for USD 4.5 Trillion a Challenge: Finance Minister Piyush Goyal", The New Indian Express, June 25, 2018.
- 9 International Labour Organisation, "By Adopting Responsible Business Practices Employers Stand to Gain a Lot", World Day for Safety and Health at Work 2013: Case Study, May 16, 2018
- 10 The New Climate Economy, "The New Climate Economy Report 2018", 2018
- 11 OECD, "Pension Funds in Figures", June 2018
- 12 OECD, *Mobilising Bond Markets for a Low-Carbon Transition*, Green Finance and Investment, 2017
- 13 Goyal, Ashima, "Where Are India's Savings?", The Hindu Business Line, November 12, 2011
- 14 Sagar, Aarsi, and Rajat Kathuria, "Financing the Urban Tiger", Journal of Responsible Finance, July 2017
- 15 Roy, Rathin, "Financial System for Sustainable Development in India", Journal of Responsible Finance, December 2016
- 16 Modak, Samie, "Sebi Norms for Corporate Bonds Could Boost Issuances by Rs 500 Bn: CRISIL", Business Standard, September 20, 2018.
- 17 Roy, Rathin, "Financial System for Sustainable Development in India", Journal of Responsible Finance, December 2016
- 18 Climate Bond Initiative, *India Country Briefing - July 2018*, July 2018
- 19 Financial Express Online, "India Needs Rs 50 Lakh Cr Infra Investment over 5 Years: Crisil", The Financial Express, October 26, 2017
- 20 Roy, Rathin, "Financing the SDGs", Business Standard, October 05, 2017
- 21 UN-FCCC (2018) op cit
- 22 Lee, Chris, Aron Betru, and Paul Horrocks, *Guaranteeing the Goals: Adapting Public Sector Guarantees to Unlock Blended Financing for the U.N. Sustainable Development Goals*, Milken Institute & OECD, April 30, 2018.
- 23 Blended Finance Taskforce, Better Finance, Better World, April 2018.
- 24 Green Climate Fund, Project FP081 - Line of Credit for Solar Rooftop Segment, March 2018.
- 25 United Nations Framework Convention on Climate Change, *Summary and Recommendations by the Standing Committee on Finance on the 2018 Biennial Assessment and Overview of Climate Finance Flows*, 2018
- 26 Waray, Sanchit, Sasmita Patnaik, and Abhishek Jain, *Clean Energy Innovations to Boost Rural Incomes*, October 2018
- 27 Indian Banks' Association, *National Voluntary Guidelines for Responsible Financing*, November 27, 2016
- 28 Arunabha Ghosh, CEEW at India-UK Green Finance Dialogue, 16 July 2018

India and the World: Fueling a New Low-Carbon Growth Model

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The Challenge

While there are few certainties in these turbulent times, it is undeniable that the response to global development goals will hinge on the global south, and in particular, India¹. Home to over a billion individuals whose lifestyle demands and aspirations are rising quickly, India's development choices acquire a unique urgency. It must be the first country of any sizeable consequence to transition from a low to middle-income economy in a fossil fuel constrained world. And in the absence of aid from developed economies, it will have to do so largely through its own political and financial arrangements.

Even as India pursues an “exceptional” industrial pathway that is untested and unprecedented, the challenge of meeting the sustainable development goals continues to vex large parts of the developing world. Obstacles such as offtake risk², underdeveloped financial markets, and perceived sovereign risk are common to many emerging economies. Done correctly, therefore, the method and mechanics of India's low carbon transition³ can provide a replicable template for development pathways across the world—especially when it comes to the objectives of mitigating carbon emissions, ensuring affordable energy access for all, and eradicating poverty. Indeed, a study of India also provides assessments and recommendations that can be used in Africa, Southeast Asia and Latin America.

The prevailing sense across the political and investor class appears to be that India's clean energy revolution is more certain than ever before. In the space of two

years, solar and wind energy prices have fallen dramatically, undercutting average coal prices by approximately 25 percent⁴. At the same time, investments in clean energy projects have risen rapidly, with \$42 billion flowing into Indian renewable energy projects over the past four years⁵.

These optimistic figures, however, should not hide the fact that the lower rates charged by renewable energy power producers are predicated upon two volatile factors – the price of materials and government policies. Prices of renewable energy components are vulnerable to shifts in trade policy⁶, currency depreciation⁷, or shifts along the demand and supply curve⁸. Moreover, with renewable power prices dropping, both central⁹ and state¹⁰ governments are reassessing the need for incentives and subsidies. In India, the recent sectoral exuberance resulting from these two factors has skirted over some serious fissures within its foundational clean energy architecture.

The first flaw is the fractured financial state of India's power sector – an issue affecting other emerging economies as well. Despite its status as one of the largest economies in the world, India has not tackled the decades-long problems that have plagued its public sector distribution companies.

The second weakness is the lack of a developed financial market in India – which once again mirrors the status quo across much of the developing world. The scarcity of debt financing for long term projects and the health of the banking sector can halt the global low carbon transition in its tracks if international economic conditions change.

The third flaw is more global—a combination of stringent financial regulations and an oligopolistic credit rating industry have made it more costly for emerging economies, such as India, to access international debt markets by as much as 35 percent¹¹.

The clean energy revolution in India and other emerging markets has capitalized on the global enthusiasm for a green evolution. However, mood and motivation can only go so far. It is imperative that some of the intrinsic issues are addressed in order for India – and by extension other emerging economies – to conduct their low-carbon transition in an economically sustainable manner.

A Closer Look

Power Distribution Companies

Historically, the power distribution companies (DISCOMS) that ensure the delivery of electricity have been the Achilles heel of the Indian economy¹² (a phenomenon mirrored in other emerging economies such as Nigeria and South Africa). A significant proportion of these DISCOMS have operated at a loss¹³ over the past fifteen years, and the sector has been bailed out by the Indian government three times over this period. With Indian DISCOMS in financial distress, the possibility of delayed payments or non-payments to renewable energy producers rises. Even a

small delay in payment can be disastrous for power producers who must ensure that their loans and interest payments are paid on time to not break debt covenants – the violation of which can have dire consequences for an investor’s entire portfolio. In certain cases, power producers have even been forced to obtain additional loans¹⁴ to service their existing interest payments and operational needs.

Unsurprisingly, the Indian power distribution sector is once again facing the same issues that it has confronted over the past two decades. Policies such as the 2015 UDAY Scheme¹⁵ and the 2016 Insolvency and Bankruptcy Code were designed to force Indian companies to exercise financial discipline and compel State governments to take responsibility for reckless pricing policies. Despite the seemingly hard-line drawn by India’s policymakers, it seems that the proverbial can will once again be kicked down the road, as the government seems to be considering waiving parts of the bankruptcy code¹⁶ for the power industry and states have failed¹⁷ to alter their pricing models. If India’s current favorable economic conditions start to turn, the continued neglect of the DISCOM issue could tarnish the hope of a low-carbon transition for the power sector. Other developing economies may suffer the same fate if they cannot alter policies and compel their DISCOMS to adhere to financial discipline.

Underdeveloped Financial Markets

While the DISCOM issue is the elephant in the room for investors in renewable energy projects in India and other emerging economies, the underdeveloped state of financial markets in these geographies can also be problematic. For example, debt financing options for renewable energy projects remain limited within India because the shorter terms of saving instruments inhibits long term loans by domestic banks.

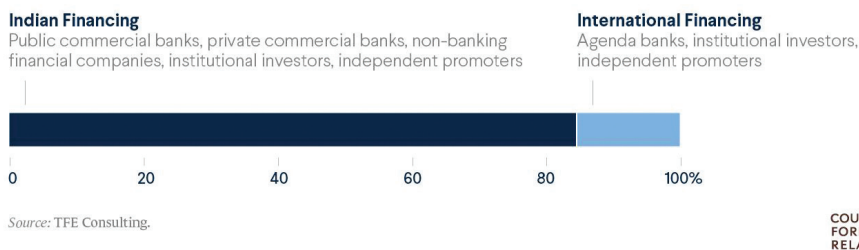
Under normal circumstances, this asset-liability mismatch can be bypassed through alternative debt instruments. The use of financial vehicles such as bonds or infrastructure investment funds however, remains limited in Indian and emerging debt markets. Green bonds can be constrained by issues such as “greenwashing” (false advertising that makes a company seem more environmentally friendly), cannibalization of institutional investor funding, and poor sovereign credit ratings. Other solutions such as infrastructure investment trusts, have found success in their limited trial runs, but need to be drastically scaled up to have any real impact.

In India, certain large banks such as Yes Bank, Axis Bank, and the State Bank of India have provided significant funding for renewable energy projects over the past three years. These loans, however, have largely been driven by macroeconomic factors such as excess capital liquidity (a result of the 2016 demonetization reform), which have largely dissipated. If the banking sector, which is teetering on the edge of a potential crisis, falls into the abyss, domestic debt financing for these projects will quickly dry up.

Sovereign Risk Rating

Domestic financial institutions are not the only sources of debt financing. International banks provide an attractive theoretical alternative for investors and project developers attempting to in India and other emerging economies. Yet, the amount of direct debt financing from international commercial banks for Indian renewable energy projects has been insignificant (see below).

Estimated Financing of Indian Solar (2016)



This phenomenon can partially be ascribed to the risk premium that commercial banks charge for operating in emerging economies such as India. These premiums are governed by macro-prudential financial regulations known as the Basel norms; and while it is difficult to identify their effect on sovereign credit ratings, the fact that international banks charged a 2.5 percent¹⁸ “country risk premium”¹⁹ for renewable energy projects in India suggests a correlation.

While the Basel Norms are theoretically sensible; in practice, they continue to propagate the misaligned geo-economic structures that were put in place with the birth of the Bretton Woods institutions. The sovereign credit ratings that are used to determine risk weightages are the exclusive domain of a triumvirate of entities—Fitch Ratings, Moody’s Investor Service, and Standard & Poor’s. These credit rating agencies are all based in the developed world, have a history of providing incorrect assessments²⁰, and most importantly – are paid by the banks they are assessing²¹.

There have been attempts to create a firewall between banks and credit rating agencies – the Dodd-Frank Act²² in the United States compels banks to assess sovereign risk as part of their risk management framework and the Basel Committee on Banking Supervision attempted to include a similar clause in Basel III. However, the internal sovereign risk assessments that American banks use are not subject to central government stress tests and the BCBS recently decided to pause its own²³ attempts to follow suit.

The disruptions caused by sovereign credit ratings go beyond the basis point increase caused by the Basel norms. Sovereign credit ratings can affect institutional and retail investor sentiment towards corporations that would otherwise be considered financially sound. The best example of this is ReNew Power – India’s largest renewable energy company, which raised a 450 million USD bond issuance

in 2017. The bond was several levels below what was considered an investment grade rating²⁴, despite excellent business fundamentals, and backing from Goldman Sachs, the Abu Dhabi Investment Authority, and the Green Environment Fund. Since the issuance of the bond, the firm has grown exponentially, cementing its place as one of India's premier energy producers²⁵.

Recommendations

In order to fuel a new low-carbon growth model in emerging markets, governments, global industry, and civil society should pursue the following recommendations.

Reclaiming the grid

The Indian state of Gujarat is the exception to the country's DISCOM issues, with all four of the state's utilities currently showing profits²⁶. Certain steps that were taken to alter the power sector can potentially be a model for other parts of the developing world.

Early in 2002, power theft in Gujarat ranged from 20 to 70 percent. A newly-elected administration took aggressive steps²⁷ to contain this power theft, including passing new legislation, improving the metering infrastructure, and setting up special police stations and courts dealing specifically with issues of power theft. At the same time, the administration also took steps to ensure that the State Electricity Board did not bow to political lobbying when deciding electricity rates for the various categories of consumers. The most important step taken by the administration, however, was splitting its feeder systems. In most Indian states, one feeder provides power to rural and urban areas indiscriminately. By splitting the feeder system, Gujarat was able to effectively manage²⁸ its power supply for agricultural consumers while curtailing the subsidization of electricity for non-agricultural consumers. While the Indian central government (as well as certain Indian states) have implemented parts of the Gujarat model, these measures (and others) go hand in hand and cannot be implemented piecemeal.

Emerging and developing countries must learn that public sector ownership of the electricity sector and large-scale subsidization of power is difficult to manage. A hybrid system that provides for those most in need, while ensuring that those that have the means to pay, do pay, is a better economic model. This transition, while difficult, has been successful in the past²⁹, and will help alleviate off-taker risk in emerging and developing countries – thereby removing one of the biggest obstacles for private capital investment. It should be acknowledged that in many parts of the world, such a transition might not be possible in the foreseeable future. In these cases, privatization combined with a direct subsidy system would be more efficient than a model based on Public Sector entities.

Deepening the wallet

Given the complexity of the world's geo-economic architecture and the interdependence of banking systems, direct economic interventions designed to

bolster debt financing are not always viable. To ensure that debt financing continues to be available for clean energy projects in emerging markets, it is sometimes more prudent to direct policymaking measures towards alternative debt vehicles.

One such alternative in emerging economies is the creation of Green Asset Backed Securities (ABS). Securitized debt has been a largely overlooked financial instrument outside of the developed world, but recent reforms have shown the potential of the asset class in emerging markets³⁰. By compiling renewable energy assets that come from different companies and geographies at various points in their operational lifecycle, banks and other financial institutions can counter many of the risks associated with individual renewable energy projects. To further bolster the credit rating of a securitized instrument, the creator of the asset can even add a tranche of non-green assets. The proceeds from selling the ABS can then be used to finance new projects, which can in turn, be securitized themselves, creating a virtuous cycle.

Another alternative to traditional debt could be developed through the creation of Green Investment Banks (GIBs). Green investment banks are government funded entities that enable private investment in low carbon assets. There are currently twelve green investment banks operating across a variety of nations and jurisdictions. GIBs operate like a normal investment bank, albeit with a sectoral bias. They can provide debt for projects through their corpus or permanent fund and raise capital through the issuance of bonds and asset backed securities. They can also invest as equity partners, developing projects and conducting due diligence, if needed. The value of GIBs comes from their flexibility and their ability to change to market conditions and trends as needed. Moreover, GIBs have sectoral experts whose skillsets allow them to understand public- and private-sector dynamics and deal with transactions of all varieties.

More importantly, however, GIBs are profitable. The United Kingdom (UK) Green Investment Bank and the Australian Clean Energy Finance Corporation have both posted return rates higher than 4 percent³¹ in recent years. Indeed, the UK Green Investment Bank was profitable enough that the government was able to sell it to a leading global investment bank, netting approximately \$200 billion³² from the sale. The creation of a Green Investment Bank in individual countries could create a sustainable, profitable option for renewable energy project developers to turn to outside of the traditional banking systems.

As seen by the recent success of securitization in India it is important for financial markets to develop ways to aggregate assets. Indeed, securitization may be the best way for many emerging and developing economies to access both international equity and international debt financing. Additionally, investing in specialized sectoral banks can reap large dividends, given sectoral expertise, flexibility and clustering and leveraging effects.

Unblocking the international funnel

In the current global geo-economic system, there is a dichotomy between the

need for credit enhancement and the defense of “safe” credit advocacy. While the Basel Accords have had a significant impact on financial flows from developed to developing economies, central bankers have been reluctant to offer any adjustments based on climate change metrics. To the economists, academics, and other intelligentsia that influence international financial regulations, adjustments to favor one sector is the equivalent of amputating an arm to treat a splinter wound.

However, splinter wounds can bring infections that affect the entire body. These preeminent minds must reconsider traditional binaries that have governed climate finance and think beyond economics in these turbulent times. Clean energy is not simply a corporate social responsibility cause. Rather, it is the best chance that the world has to divert large scale weather variations that will certainly affect all industries and businesses. Basel IV, the proposed reforms for the global banking regulatory framework, should consider exceptions to climate change— either by incorporating the susceptibility of a bank’s portfolio to climate change related damage or implementing a green factor on risk weightages for renewable energy projects. Emerging and developing economies must ensure that their voices and opinions are heard, given the disproportionate disadvantage that the Basel Accords impose on them and the consequences many of them face if the Paris accords are not adhered to.

By the same token, credit rating agencies must either be held accountable to certain standards, with larger punitive measures in cases of failure, or open their oligopolistic industry to new entrants. Sovereign credit ratings must be comparative across the emerging and developed world—Greece, for example, should not have had a higher credit rating than India, even prior to its economic collapse. Emerging economies must unite and look to adopt alternative international credit rating options if the existing ones continue to show prejudice.

Conclusion

The significance of India’s development choices should not be underestimated. If the success of the Millennium Development Goals was predicated on China’s economic rise, India’s capability to replicate the same in a carbon scarce world will determine the impact of the Sustainable Development Goals.

In the process of lifting millions of its own people out of poverty, India’s industrialization pathway may also offer solutions for emerging economies, who seek to capitalize on green investments. As the Indian example suggests, structural reforms in power distribution and creating a more mature financial marketplace for the renewables sector are a few domestic policy tools emerging economies can employ. Still, rigid global financial norms and opaque credit rating practices will continue to hinder their prospects. Ultimately, both emerging economies and international institutions must find new and innovative policy tools to secure low carbon pathways.

Endnotes

- 1 Saran, Samir. "As a Rising Global Power, What Is India's Vision for the World?" World Economic Forum. August 14, 2018.
- 2 Off-Taker risk can be defined as the risk of a power producer not getting paid for their electricity on time.
- 3 Pandey, Aparajit. India's Low Carbon Transition. OECD. May 2017.
- 4 N, Sushma U. "Like Solar, Wind Power Is Now Cheaper than Coal-based Electricity in India." Quartz. December 21, 2017.
- 5 *Economic Times*, "Over \$42 Billion Invested in Renewable Energy Sector in India in 4 Years: Govt - ET EnergyWorld", ETEnergyworld.com, June 05, 2018.
- 6 Raghavan, T.C.A. Sharad. "Solar Cell Safeguard Duty Put on Hold." The Hindu. August 13, 2018.
- 7 Kundu, Tadit. "Why a Falling Rupee Should Worry Us." LiveMint. August 28, 2018.
- 8 Aggarwal, Mayank, and Utpal Bhaskar. "Rising Chinese Solar Module Prices May Put Solar Power Projects at Risk." LiveMint. July 18, 2017.
- 9 Government of India. Ministry of Finance. Economic Survey of India 2017-2018
- 10 "Karnataka Imposes Wheeling Charges on Renewable Projects." Mercom India. May 21, 2018.
- 11 TFE Consulting. India's Solar Leap: Financing a Mature Market. November 2017.
- 12 India's DISCOM problems are related to three distinct factors – poor pricing models due to political interests; weak corporate governance; and ailing infrastructure. Any measure to reform the sector must account for all three factors.
- 13 Mathur, Vikrom, Aparajit Pandey, and Aparna Roy. "Mobilising Private Capital for Green Energy in India." Observer Research Foundation. December 14, 2017.
- 14 Financial Express Online. "Regulatory Delays: Power Ministry Asks CERC to Speed up Clearing dues." The Financial Express. August 29, 2018.
- 15 In 2015, the Government of India implemented the Ujwal Discom Assurance Yojana (UDAY) scheme, intended to revive India's DISCOM sector. The consensus amongst financial analysts and industry executives is that it provides a short term fix without addressing the long term issues.
- 16 Financial Express Online. "The Policymaker versus The promoter." The Financial Express. August 27, 2018.
- 17 Financial Express Online. "UDAY Scheme Impact: Now, Complacency to Cost Electricity Discoms dear." The Financial Express. April 23, 2018.
- 18 TFE Consulting. India's Solar Leap: Financing a Mature Market. November 2017.
- 19 The country risk premium is independent of any currency hedging costs.
- 20 Creswell, Julie, and Graham Bowley. "Ratings Firms Misread Signs of Greek Woes." The New York Times. November 30, 2011.
- 21 Robinson, Matt, and David McLaughlin. "S&P Ends Legal Woes Paying \$1.5 Billion Fine to U.S., States." Bloomberg.com. February 3, 2015.
- 22 The Dodd-Frank Wall Street Reform and Consumer Protection Act was passed in 2010 by the United States of America in response to the 2008-2009 Financial Crisis. A modified version of Basel III was implemented in 2013, integrating parts of Dodd-Frank and Basel III.
- 23 "Basel Regulators Make U-turn on Banks' Use of Credit Rating Agencies." Reuters. October 09, 2015.
- 24 Roy, Anup. "ReNew Power Raises \$450 Mn in Green Bonds." Business Standard. February 06, 2017.
- 25 Banerjee, Jasodhara. "ReNew Power Ventures: Impressing Investors with Outstanding Performance." Forbes India. November 21, 2017.
- 26 Government of India. Ministry of Power. *DISCOM Wise AT&C Loss Trajectory up to 2021-22*.
- 27 Madhavan, N. "Gujarat's Power Sector Turnaround Story." Business Today. February 07, 2012.
- 28 "Feeder Separation." Welcome to Power Line. May 07, 2017.
- 29 Pollitt, Michael. "Electricity Reform in Chile. Lessons for Developing Countries." *Competition and Regulation in Network Industries* 5, no. 3-4 (2004): 221-62. doi:10.1177/178359170400500301.
- 30 Ram, Aliya. "Government Reforms Unleash India's Securitisation Market ." Financial Times. June 08, 2017.
- 31 OECD. Green Investment Banks. The New Climate Economy. January 2017.
- 32 U.K. Gov. Press Bureau. "UK Government's Sale of Green Investment Bank Completed." News release, August 18, 2017. www.gov.uk.

Sustainable Corporate Growth: Restructuring Executive Pay to Drive Long-Term Performance

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Introduction

This paper aims to formulate an approach to enhance corporate sustainability by aligning the interests of executives with those of company shareholders.

Environmental, social and governance (ESG) issues that companies face pose a material downside for investors. Historically, governance and social issues have had significant impact on some companies in India. However, in recent years, environmental issues—namely, Climate Change (CC)—too has emerged as a serious threat. Managing these risks is important for the sustainable long-term growth of any company. Yet, large Indian corporates have so far failed to manage these risks effectively.

In the developed markets, investors are targeting the corporate boards to help drive executive focus towards sustainable long-term growth by managing ESG risks. In companies where the executive reward mechanism is tied to short-term performance objectives, the boards face difficulty in integrating sustainability in business decisions. Thus, it is crucial to link “executive pay” to long-term growth of the company and shareholder value creation.

From the Indian corporates’ perspective, the challenges are no different. The analysis of executive remuneration for select blue-chip Indian companies highlights various issues with executive pay structure, including inadequate disclosure; no or low ownership of executives in the company, focus on annual bonus; long-term

incentive, generally encashable on a pro-rata basis within four years (which is not adequately long-term), executive pay increments that are not commensurate to shareholder returns; and a wide range for the pay ratio. This paper makes six recommendations to improve transparency around executive pay and enable its alignment with long-term sustainable growth of the company. These suggestions, if implemented, can help ensure that the “pay for performance objective” is followed by the companies in both letter and spirit.

Managing ESG Risks: Key to Driving Sustainability

Given the cost pressures faced by the investment management industry, the share of passive investments is on the rise. Global investment managers are now turning towards companies with long-term sustainable business-growth models. For companies to deliver sustainable growth, effective management of their ESG risks is crucial. However, various Indian companies are currently struggling to manage these risks.

The corporate governance issues at some of the large Indian companies, such as USL (2015), Tata Group (2016), Infosys (2017), Fortis Healthcare (2018), ICICI (2018) and ILFS (2008) have adversely impacted their brand image and destroyed investors’ value, at least in the short term. Some of these companies have also been materially affected due to social issues, giving investors further cause for concern. The examples include Tata’s proposed project in Singur (2008), POSCO’s proposed plant in Orissa (2005–18), Coca Cola’s operating and proposed bottling plants in Rajasthan, TN and UP (2014–16), Mahan Coal project (2014), Nestle’s Maggi fiasco (2015) and Vedanta’s Tuticorin plant (2018).

Additionally, ‘Climate Change’ (CC) now poses significant risk to companies. In certain sectors, it threatens not only the growth of the companies but also their existence. Figure 1 explains the key risks posed by CC, with some examples. Globally, various investors and companies have been announcing their strategies to mitigate these risks (See Figure 2 and 3). Similar strategic actions will help Indian investors and companies manage these risks.

Driving Top-Down

In a corporate world, the performance benefits of executive-led mandate far exceeds that of any individual effort. Figure 4 explains this point better. To drive the sustainability agenda in corporates, large investors are increasingly focusing on the role that corporate boards can play. For example, the US pension funds CalPERS and CalSTRS, in their governance principles modified in 2017, have explicitly requested company boards to have stronger experience and expertise on climate-risk management.³ The General Data Protection Regulation (GDPR), which came into effect in EU this year, mandates the appointment of a Data Protection Officer (DPO) who would report directly to the company board. This highlights the need for requisite experience at the board level, to better understand and manage data-privacy risks.

Figure 1: Risks Faced by Companies due to Climate Change

Risk type	Description	Examples
Physical	Climate Change is resulting in increased frequency and intensity of extreme weather events such as storms, floods, drought or heat waves, which leads to increased damage to infrastructure, buildings or stock.	The Chennai floods in 2017 are estimated to have caused an economic loss of INR 15,000 crore, and insurance claims of around INR 6,000 crore were paid out (Source: LiveMint, Financial Express). The Uttarakhand floods in 2013 resulted in economic losses of INR 7,200 crore and insurance payouts of INR 3,000 crore (Source: ICICI Lombard, Business Standard).
Secondary	Rising temperature is causing a decline in crop yields, changes to water cycles, increased air pollution, human migration etc.	There are various examples from India where water shortages, especially in the summer season, result in closure of industrial units such as power plants, pulp and paper mills, refineries, textile units and sugar factories. These industrial units are located across the country.
Policy and Transition	National or international policy responses to CC, such as the carbon tax or subsidy withdrawal are causing impairment of assets and/or incremental expenditure for companies.	Retrofitting of Indian coal-power plants to meet the revised emissions norms (announced in 2015) is likely to cost the small- and medium-sized power units INR 15–20 lakhs/MW (Source: CSE ¹). India's decision to move to BS VI is likely to shrink the market share of diesel cars to less than 25 percent from 42 percent in FY2017, due to increased diesel-car prices as compared to petrol-car prices (Source: ICRA, ET ²).

Source: ORF.

Figure 2: Climate Change (Carbon) Risk Mitigation Strategy of Some Investors

Name	Investor type	Activities affected	Revenue threshold for exclusion of companies from their investment portfolio
Allianz AG	Insurance	Mining and power production	30%
Axa Group	Insurance	Mining and power production	50%
Caisse Des Dépôts	Public sector Financial institution	Mining and power production	20%
CalPERS	Public pension fund	Thermal coal mining	50%
Church of England	Ethical investor	Thermal coal mining	10%
Norwegian government pension	Public pension fund	Mining and power production	30%

Source: Novethic, Caisse des Depots, *How to Divest from Fossil Fuels and Invest in Green Economy*, Divest-Invest Guide, December 2017.

Note: This is not a comprehensive list. Various other global investors/banks, including the World Bank, have announced stoppage of financing to coal-based power projects or coal mining. Some of them have also stopped funding of Oil Sands in Canada and cut down their financing to the O&G sector.

Figure 3: Examples of Risk Mitigation Approaches Taken by Companies

Entity	Risk mitigation approach
Eurelectric	Eurelectric, which represents 3,500 utilities primarily from Europe, have vowed a moratorium on new investments in coal plants after 2020.
Rio Tinto	The second-largest miner globally, Rio Tinto completely exited from coal mining in 2018 by selling all its coal assets.
South 32	South 32, spun off by BHP Billiton in 2015, has decided to offload its four South African coal mines, thereby exiting the coal business.
Toyota and Honda	The 2011 Thailand floods adversely impacted the supply chain of these two auto majors and other OEMs. As a result, these companies decided to redesign their supply chain and spread out their parts sourcing and the assembly line to multiple locations. Additionally, they moved some of their operations to locations outside Thailand.

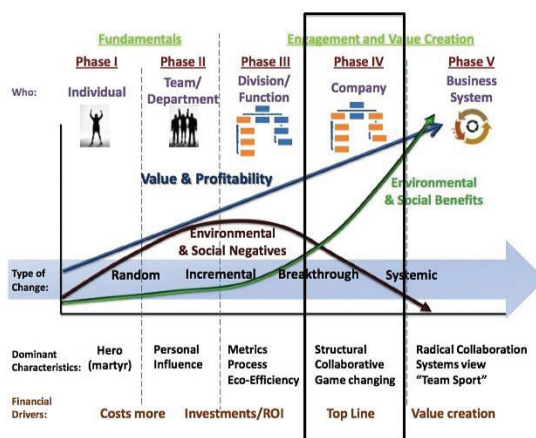
Source: Guardian, reneweconomy.com.au.

Note: These are select examples. Various companies, especially the ones with HQ in the developed markets, have strategies to manage the climate risks they face.

With ESG risks posing significant downside for investors, it is crucial that Indian companies effectively manage these risks.

With executive teams more focused on short-term gains in line with their performance objectives, company boards face challenges in driving a sustainability agenda.

Figure 4: Performance Benefits of Executive-led Mandate vs. Individual Efforts



Source: Making Sustainability Stick by Kevin Wilhelm, <http://www.expressworks.com/health-safety-environmental-programs/sustainability-top-down-or-bottom-up/>.

At many corporates, the sustainability agenda could be at conflict with the approach adopted to remunerate executives based on short-term financial performance.

Building Skin-in-the-Game

A section of investors in the developed markets have been consistently voicing their concerns regarding mismatches or conflicts between executive gains and the company's growth. These investors seek to improve the relation between executive remuneration and a company's sustainable performance and strategic goals. They also aim to achieve transparency and disclosure on pay structure. The objective is to align the interests of the executive with that of shareholders by structuring the former's reward mechanism.

There has been some activism around executive pay in India, though it is currently at a nascent stage. In future, such activism is expected to gain momentum and become more focused. It is also likely to bring to the fore the issue of regulating executive pay.

Executive Pay: Regulation Driven or the Company's Prerogative?

The very foundation of executive pay rests on effective corporate governance, which is deep rooted in ethics and self-regulation, besides the fiduciary duties of directors. There have been cases globally as well as in India that violated the true spirit and principles of good corporate governance. This resulted in some governments and market regulators—especially in the banking sector—framing regulations on executive pay. Such regulations are meant to curb excessive risk-taking by executives and provide some checks and balances to ensure that the decision on pay is not in contrast with company's performance.

For the Indian corporates, the Companies Act, 2013; the relevant rules made thereunder; and the listing regulations prescribed by SEBI provide the guiding framework on executive remuneration. These include directives for the companies to seek approval from shareholders when the total pay exceeds a certain level. Under a particular scenario, permission is also to be sought from the federal government (See Figure 5). Additionally, the Act mandates some disclosure requirements (See Figure 6).

Indian private-sector banks must follow the RBI guidelines on executive pay, in conjunction with the requirements mandated by the Companies Act, 2003 and the SEBI listing requirements. These guidelines are driven by the principles of the Financial Stability Board (FSB) on sound compensation policies, which were released after the global economic downturn in 2009. These are directed towards curbing incentives that result in excessive risk-taking in the short term. Some of the key points are summarised in Figure 7.

While executive pay is a board's prerogative, the Companies Act has certain provisions that define some limits on the remuneration and disclosure requirements.

Figure 5: Conditions when Shareholder/Government Approval is to be Sought

S. No.	Description of conditions
1	Proposed managerial remuneration payable exceeds 11 percent of the net profits.
2	Remuneration payable to any one managing director, full-time director or a manager exceeds five percent of the net profits. If there is more than one such director/manager, their cumulative remuneration exceeds 10 percent of the net profits.
3	Total remuneration payable to directors who are neither managing nor full-time directors exceeds 1 percent of the net profits of the company (if there are managing or full-time directors or managers at the company), and in any other case, three percent of net profits.

Source: MCA.⁴

Figure 6: Some Key Disclosure Requirements on Executive Pay

S. No.	Disclosure Items
1	Ratio of the remuneration of each director to the median remuneration of the employees for the financial year
2	The percentage increase in remuneration of each director, CFO, CEO, company secretary or manager, if any, in the financial year
3	Affirmation that the remuneration is as per the remuneration policy of the company, amongst other requirements

Source: Taxmann.⁵

Figure 7: RBI Guidelines on Executive Pay for Private Banks

S. No.	Key points in the guidelines
1	The variable pay component should not exceed 70 percent of fixed pay.
2	When variable pay exceeds 50 percent of fixed pay, 40–60 percent of it should be deferred over three or more years, with vesting no earlier than the pro-rata basis.
3	Variable pay must not include the value of ESOPs and other equity-linked options.
4	No upfront cash for any sign-on bonus or a guaranteed bonus should be given to a WTD or CEO.
5	Malus clause allows for reduction or elimination of deferred bonus, if performance conditions are not met over the vesting period.
6	Claw-back provision allows recouping even the vested awards in case any of the executive actions are found to be detrimental to the business.
7	The remuneration must be approved by the RBI.

Source: RBI.⁶

Figure 8: Components of Executive Pay Structure

Key components of executive pay						
Fixed Pay			Variable pay			
Base pay	Allowances and perquisites	Retiral benefits	Annual bonus / Commission		Long-term incentive (LTI)	
			Performance metrics	Performance benchmarks and targets	Target pay and range for over and under achievement	Payment mechanism (Cash, Stocks, ESOPs, RSUs, SARs)
						Disbursal schedule (Grant, Vesting, Holding and Exercise periods)
						Provisions for Malus and Claw-back of benefits

Source: ORF.

Note: PSUs means Performance Stock Units, RSUs mean Restricted Stock Units, SARs means Stock Adjusted Rights.

Analysing Executive Pay at Indian Companies

This section looks at the executive pay structure of sample companies. The analysis is focused on the variable pay components listed in Figure 8.

Sample Portfolio of 14 Large Corporates

The analysis looks at the Sensex companies, which are the crème de la crème of Indian corporates. The 30 entities in the Sensex (Index) are over 40 percent of the total market cap of the Bombay Stock Exchange (BSE) and can be broadly classified under two categories:

- Entities where promoters execute the role of a Managing Director (MD) or CEO; and
- Entities where at least one of the roles—MD or CEO—is not one of the promoters and the individual executing the role enjoys full executive powers; is on the company board; and is paid significantly higher than promoters, reflecting their responsibilities.

The second category has 19 entities, including five in which the government is the majority owner. Unlike private-sector enterprises, the government-owned entities have a flat pay structure, with a small share of variable pay in total remuneration. After excluding them, the sample portfolio includes five financial institutions (FIs) and nine corporates. Figure 9 examines the executive remuneration of these 14 entities.

Key Findings

Disclosures aimed at meeting the regulatory requirements: While the executive pay disclosures meet the regulatory requirements, they lack details on various key components, such as (i) performance metrics and indicator weights; (ii) targets and benchmarks on key indicators; and (iii) target pay and the pay range for over

Figure 9: Fourteen Entities Shortlisted for Analysis

Category	Count of entities	Entity names
Financial Institutions (FIs)	5	Axis, HDFC Bank, HDFC, ICICI and IndusInd
Corporates (other than the FIs)	9	Asian Paints, HUL, Infosys, ITC, L&T, Tata Steel, TCS, Tata Motors and Wipro

Source: ORF.

or under achievement. For various corporates (excluding banks), it's not clear if they have a policy on malus and claw-back of rewards. Without disclosures on the mentioned parameters, shareholders can't ascertain the basis of increases in annual bonus and long-term incentives paid to the executives.

Executives have 'no' or 'low' stakes: The analysis reflects that in most corporates, the CEO or MD does not have any material shareholding in the company.

For the nine companies analysed, this ratio range is 0.0–0.03 percent, while for the FIs (with the exception of HDFC Bank), it is 0.02–0.07 percent.

In the case of HDFC bank, the CEO's shareholding is 0.14 percent of the share capital as of 31 March 2018. In value terms, this translates to 69 times the annual compensation paid to the CEO in FY2018. The company performed better than most of its peers on total shareholder return (TSR), despite its large operations. (Note: The equity value is based on the average of maximum and minimum share price recorded in March 2018.)

Annual cash bonus is prioritised over long-term incentive (LTI): The number of entities, particularly corporates, that paid the annual bonus or commission (in cash) exceeds the ones that paid long-term incentive (in shares/options). Some corporates don't appear to have any policy for providing LTI, suggesting a lack of investment towards long-term performance.

LTI can be encashed on a pro-rata basis in two to four years, with some exceptions: Most companies generally pay the LTI in the form of shares, using Employee Stock Option Plans (ESOPs). Some other instruments used by select companies include Restricted Share Units (RSUs), Performance Share Units (PSUs) and Share Appreciation Rights (SARs). The instruments are generally granted at the end of performance period and will vest on pro-rata basis in three annual instalments for most companies. A few companies have vesting periods of four to five years. Depending on the company's policy, these options can be exercised after six months from the vesting date. Effectively, for most companies, roughly two-thirds of the LTI can be encashed within three years from the financial year close, which is not sufficiently long term.

CEO pay increments are commensurate to shareholders' returns: A comparison

between the increases in a CEO's salary and the changes in total shareholder return (TSR) plus the company's performance over a three-year period (FY2015–18) reflects a disconnect between the pay rise and the total shareholder returns in many cases. The limited disclosures made by the companies make it difficult to comprehend the basis for increase in executive pay. The Companies Act further mandates disclosure of the company performance for changes in P/E ratio and market cap. The changes in executive compensation does not reflect material correlation with these two parameters either.

Wide range for pay-ratio calls for more detailed analysis: For the nine companies (excluding banks), the analysis shows a pay-ratio range of 100–400x for FY2018. (Note: “Pay-ratio” is defined as the ratio of annual total compensation paid to the CEO and the median of annual total compensation of all employees.) Given the difference in business of these companies and their operation sizes, a comparison between them may not be significant. However, this wide range in the ratio speaks to the need for a more detailed analysis, especially for companies at the upper end of the range. For the five banks, the analysis shows a pay-ratio range of 83–209x for FY2018. This variation can be attributed to, among other factors, the difference in operation size and the business segments of these banks. No meaningful conclusion can be made in isolation without a detailed analysis.

Way Forward

The following recommendations are aimed at aligning the interests of executives with that of shareholders to help companies adopt global best practices.

Introduce ownership provision: Given the no or low stakes of executives in the company, it is necessary for the board to decide a minimum level of share ownership that the CEO or MD must have within a pre-determined timeframe. In many US companies, this level is fixed at six times the CEO's annual salary but can be higher in some cases.⁷ Indian companies can start at a level similar to the US corporates.

Focus on LTI, not annual cash bonus: The global economic crash of 2008–09 is attributed to excessive risk-taking by some bankers in banks that offer faulty incentive pay structures. This downturn forced the industry to modify its pay practices and adopt some risk-mitigation features in the form of deferred bonus and claw-back provisions. The RBI guidelines on executive pay for Indian private banks—released in 2012 and discussed earlier in this note—explains this point. A pay structure focused on LTI, instead of annual bonus, will help channel executive focus on sustainable growth and mitigate any tendencies towards excessive short-term risk-taking.

Increase the vesting and holding period of allotted shares: The LTI is paid in the form of options or shares that are generally vested annually on a pro-rata basis in three instalments and can therefore be encashed in two to four years. This is too short a period for redeeming a reward classified as long-term incentive. It is prudent to vest these shares/options only after three years from grant date, with a minimum lock-in period of two years from the vesting date. This will imply a

holding period of at least five years and will also support the ownership clause discussed in the first point.

Introduce claw-back and malus provisions in pay: While banks have implemented such provisions, many of the corporates analysed are yet to do so. These two provisions can act as major deterrents on short-term excessive risk-taking and drive the focus on long-term sustainability. The “claw-back provision” allows an organisation to reclaim the paid-out compensation as a result of a financial restatement or any gross negligence on part of the executive. The “malus clause” on deferred compensation allows companies to revise or refuse payments if performance results over an extended multi-year period are below the target envisioned when the original award was determined. Thus, companies can refuse or eliminate payout of deferred compensation, compelling executives to think from a long-term perspective.

Incorporate ESG performance indicators in the pay metrics: ESG issues can pose significant risks for both companies and investors. It is, therefore, important for every company to identify the most material ESG risks they face and include them in the CEO pay metrics along with the performance targets. Linking performance against these indicators can help hold the executive accountable for the delivery of sustainable business goals. Currently, most companies focus on financial indicators and don't pay adequate attention to ESG indicators.

Improved disclosure on pay beyond regulations: The disconnect between a company's performance and the CEO's pay increment is a major concern for investors. Companies must improve transparency and disclosures regarding linkage of annual bonus and share options with performance indicators. This requires clarity on compensation metrics such as key indicators, performance targets, target pay and corresponding pay for over and under achievement vis-à-vis the target.

Endnotes

- 1 <http://cdn.cseindia.org/userfiles/Introduction-on-New-environmental-norms-for-coal%20based-power-plants.pdf>.
- 2 “Demand for diesel vehicles to decline to sub 25% post implementation of BS VI norms,” ICRA.
- 3 <https://www.triplepundit.com/2017/03/corporate-sustainability-trends-2017/>.
- 4 <http://www.mca.gov.in/SearchableActs/Section197.htm>.
- 5 <https://www.taxmann.com/datafolder/News/Chapter%20XIII.pdf>.
- 6 <https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=6938&Mode=0>.
- 7 The MERIDIAN Compensation Partners in their 2016 Corporate Governance and Incentive Design Survey on 250 large listed US companies.

Gender in Climate Finance: Opportunities and Challenges

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Overview

The impacts of climate change will be global but not equitable. Already marginalised people will be more affected than those with greater capacity and resources to absorb shocks and shifts in their local environment.¹ At present, nearly a third of all annual human deaths are due to poverty-related causes.² Climate change will likely exacerbate this. Women and girls, most of them in South Asia and Sub-Saharan Africa, make up the majority of the world's two billion poorest people. Combined with persisting norms that discriminate against women, this makes them disproportionately vulnerable to climate risks.³

The persisting structural inequalities that render women particularly vulnerable and threaten to widen existing gaps include gender-based differences in: access to assets and opportunities; time use and mobility; access to credit and treatment by markets; and formal institutions and legal frameworks. In addition, women's disproportionate involvement in domestic responsibilities and their over-reliance on natural resources for their livelihoods and for fulfilling household responsibilities, further expose them to adverse impacts.⁴ For instance, in rural India, women are predominantly responsible for the procurement of water for the household. The perceived effects of climate change on water scarcity could have a very direct impact on women's mobility, time use, and vulnerability.⁵ As over-reliance and unsustainable consumption increase the pressure on groundwater resources and as prolonged droughts escalate water stress, women have to travel longer distances to meet their water and sanitation needs, resulting in increased vulnerability and

opportunity cost. According to a recent report, 23 percent of girls in India drop out of school⁶ upon reaching puberty due to lack of water and sanitation facilities.⁷ Similarly, the 2004 earthquake and tsunami highlighted the gendered nature of disaster risk – four times as many Indian women as men died in the affected region.⁸

While climate risks are not gender-neutral, women's greater proximity and reliance on natural resources also equips them with unique mitigation and adaptation experience, and consequent expertise. For instance, in many cases, women are already involved in leading community-based strategies for implementing low-carbon pathways and reforestation and restoration efforts. Increasingly, research⁹ recognises women as important stakeholders in climate mitigation efforts and also supports the idea of harnessing women's capabilities as farmers, producers, consumers, entrepreneurs, household managers, and community-mobilisers for better adaptation strategies.¹⁰

Despite the evidence, progress on the effective integration of gender considerations into climate finance mechanisms is recent. Over the last few years, existing multilateral climate finance mechanisms have formally integrated gender into their design and operationalisation, demonstrating varying levels of gender-responsiveness. While the Green Climate Fund (GCF) has a Gender Policy and Action Plan and the Clean Investment Funds (CIFs) have dedicated gender policies, challenges remain in the broader climate finance regime.

A 2016 UNDP report highlights how gender inequalities of the world are mirrored in the funding gaps, leadership, and even documentation that drive climate action. According to the report, only 0.01 percent of all worldwide funding supports projects that address both climate change and women's rights.¹¹ Further, it is mentioned that in 2011 and 2012, just two percent of all bilateral aid was directed towards initiatives that had women's economic empowerment as a principal objective. In terms of global leadership, only 14 out of 193 (seven percent) of finance ministers were women in 2015.¹² During the same year, female representation in the governing bodies of the major climate funds stood at an average of 22 percent.¹³ Lastly, in terms of documentation, a 2012 assessment of Clean Development Mechanismⁱ (CDM) projects concluded that only five of the 3,864 projects (0.13 percent) included gender considerations in their documentation.¹⁴

To be meaningful, gender integration must go beyond being an “add on” in climate action programmes towards being a core focus of multilateral funding operations and national planning.¹⁵ This article examines the gender-climate finance nexus and assesses the existing best practices, as well as remaining challenges in building gender considerations into climate finance.

i The Clean Development Mechanism (CDM), provided for under Article 12 of the Kyoto Protocol, enables developing and developed countries to participate in joint greenhouse gas (GHG) mitigation projects. Under this Protocol, countries (developed countries and economies in transition) are required to reduce GHG emissions to below their 1990 levels. The CDM enables these countries to meet their reduction commitments in a flexible and cost-effective manner. It allows public or private sector entities in countries to invest in GHG mitigation projects in developing countries. (Government of India, Ministry of Environment and Forests)

Unpacking gender-responsive climate finance

Extant literature based on the experiences of international development programmes suggests that an increase in the gender-responsiveness of climate change funding is directly proportional to its effectiveness and efficiency while simultaneously leading to an improvement in women's lives.¹⁶ For instance, financing projects aimed at promoting sustainable environmental practices that explicitly take into account women's time-cost and effort involved in walking distances to access water, sanitation facilities, as well as energy sources will not only lead to better environmental outcomes but also decrease the burden of environmental deterioration that women face on a daily basis as they carry out these tasks.¹⁷

Similarly, in developing countries – where more than 90 percent of the top 200 fastest growing cities are located – the challenges of urban transport could be addressed through a gender responsive mitigation lens. The growing urban population will require robust means of transport. An increase in personal modes of transportation would have negative environmental ramifications. Therefore, investing in projects to build cleaner public systems such as bus-rapid transit (BRT) will increase efficiency in multiple ways—these schemes must also recognise the gender-specific security concerns of women in addition to the different needs of men and women with regards to affordability, schedule flexibility, trip length, frequency, and density of the transit network. Not only will this lead to an increase in ridership and the consequent reduction in the second largest global contributor to GHG emissions,¹⁸ addressing gender-specific needs would also optimise the use of public transport by women – increasing their access to employment, education and services that contribute to strengthening resilience.¹⁹

Further, while women entrepreneurs in developing countries can play a critical role in providing services, mobilising the community, and transitioning to greener technologies – particularly in the energy sector – they are typically concentrated in micro and small-scale enterprises due to unequal access to loans, lack of property and physical assets to use as collateral, mentorship, affordable technologies, shaped by dominant cultural and structural biases. In this regard, private sector initiatives supported by gender-responsive climate finance mechanisms, can play a crucial role in providing market-oriented guidance in helping these micro-, small- and medium-sized enterprises to grow.²⁰

In addition, financing projects that prioritise the resettlement of women-headed households in disaster relief and rehabilitation processes will not only support recovery efforts but also reduce the documented gender-specific heightened risks faced by female refugees and their families. It is clear from these examples that if carefully designed and implemented, gender-responsive climate finance initiatives are likely to improve outcomes and therefore, be more effective. However, despite growing acknowledgement of the centrality of gender in climate mitigation and adaptation – and some progress in recent years, particularly in multilateral funds – the methodical and rigorous incorporation of gender considerations has not been mainstreamed across the larger climate finance regime.

One example of this is visible in Clean Development Mechanism (CDM) projects. CDM, provided for under Article 12 of the Kyoto Protocol of the United Nations Convention on Climate Change, enables developing countries to participate in joint greenhouse gas (GHG) mitigation projects with developed countries. According to estimates, 84 percent of all registered CDM projects are implemented in the Asia-Pacific region, and in 2012, nearly 30 percent of these were in India. Given that most CDM projects are operating in developing countries, the main criticism faced by the mechanism has been over its disproportionate focus on large-scale projects; it fails to give sufficient consideration for low-technology driven, small-scale, community-based approaches that women are typically involved in such as tree planting for reforestation mitigation. CDM's focus on large-scale projects automatically leaves behind the marginalised populations with inadequate access to resources and capacities, including women.

Under the CDM, the Bagepalli Biogas Programme (UNFCCC Project 0121), registered in December 2005, is considered a good climate finance practice that benefits women and marginalised communities. With the aim to replace the use of non-renewable biomass with clean and sustainable biogas units that convert cow and goat dung to cooking gas, the project has so far benefited 5,500 households. The women were able to save costs on kerosene, benefit from the employment creation and the reduction in time and effort involved in energy collection. While the central aims of reduction in GHG emissions and conservation of forest resources were achieved, the co-benefits were equally significant.²¹

Without similar focus on leaving no one behind, the CDM, which was created to help marginalised countries, will continue to itself marginalise communities. As evident in the Bagepalli Biogas Programme, women's proximity and dependence on natural resources forces them to become knowledgeable practitioners and innovators in energy use, and in many cases in agriculture, forest technologies, and livestock management as well. Therefore, financial support for their small-scale projects in energy management, agriculture and forestry will likely yield sustainable outcomes. Conversely, it is clear that carefully designed climate finance vehicles will also help redress structural inequalities that adversely affect women's resilience capabilities.²²

Gender in existing global climate funds

Gender considerations have largely been ignored in the initial design and operationalisation of most existing dedicated climate financing mechanisms. What has helped in the retroactive integration of gender into global climate finance regime is continued evidence-backed advocacy, along with recognition of the increase in efficiency and effectiveness of gender-responsive climate finance projects. This is true particularly in multilateral climate finance mechanisms in the form of programming guidelines and structures.^{23 24}

The Green Climate Fund (GCF), established in 2010 to help support the transition to low-emission and climate-resilient development, has incorporated gender into its governing instrument and has a separate Gender Policy and Action Plan.

²⁵ Similarly, the Clean Investment Funds (CIF), a set of financing instruments to support the transition towards climate-smart development in developing countries, has a Gender Action Plan that was approved in 2014.²⁶ Although multilateral funds are not the only sources for climate action funding—as there are other public and private financing streams—they contribute a significant share. Further, they play a crucial role in setting norms for other funds and serving as examples for national policy pathways on climate finance.²⁷

Green Climate Fund: Work in Progress

The first multilateral fund to incorporate a set of comprehensive gender-responsive criteria was the GCF model. It highlights multiple strategies for systematic gender integration and some remaining implementation challenges. In the context of best practices, the GCF mandates gender balance for its staff and Board. Further, the governing instrument for the GCF includes multiple references to gender and women in the Fund's governance and operational modalities, including on stakeholder participation and a gender-mainstreaming mandate under its funding objectives and guiding principles.²⁸ Further, the GCF approved a dedicated gender policy and action plan in March 2015.

While these are positive developments, recent research by the Heinrich Böll Foundation, North America highlights the remaining gaps.²⁹ For instance, while the GCF mandates gender balance for its staff and Board, in reality, of its 24 Board members, only six were women (25 percent) as of October 2017, with eight female alternate Board members. Further, it was highlighted that while the GCF's strategic plan mentions gender sensitivity, it does so insufficiently. Also, its participatory monitoring approach as part of the Monitoring and Accountability (M&A) framework are currently underdeveloped. The research also indicates that the integration of gender in GCF projects and programmes requires stronger enforcement. For instance, while every proposal is required to be submitted with a project-specific gender action plan, it has been found that some proponents submit plans or budgets with insufficient analysis and gender responsive implementation strategies.³⁰ To truly institutionalise the gender considerations, it has been proposed that the GCF be willing to return funding proposals to its implementation partners when gender is inadequately considered.³¹

Other pertinent issues included variations in the quality of gender assessments, insufficient clarity on indicators to measure results against, and inadequate division of responsibilities. For example, it was found that gender assessment of project/programmes is sometimes outsourced to consultants with no gender expertise.

Some of these concerns have already been addressed to an extent. In 2016, a consultative review process involving the Board and stakeholders for improving GCF dedicated Gender Policy and Action Plan was started. The inputs and recommendations resulted in the following focus areas for improvement in the updated Gender Policy and Action Plan 2018–2020: ³²

- a. The policy emphasises gender responsiveness rather than gender sensitivity.

- Being “gender-responsive” means that instead of only identifying gender issues or ensuring a “do no harm” approach, a process will substantially help to overcome historical gender biases. This is in line with the language used in UNFCCC decision CP.20 (Lima Work Programme) and the Paris Agreement;
- b. In addition to requiring gender assessment, the policy suggests a mandatory requirement to submit project-level gender action plans;
 - c. The policy outlines clear requirements at the project’s inception, implementation, monitoring and reporting stages as well as in regard to roles and responsibilities among GCF, AEs, and NDAs /focal points;
 - d. The policy aligns with the United Nations Sustainable Development Goals (SDGs), which make explicit commitments to gender equality both as a stand-alone goal on gender equality and women’s empowerment in SDG5 and as a cross- cutting theme across all the SDGs; and
 - e. The action plan provides portfolio-level, gender-responsive indicators to the Action Plan of the updated Gender Policy, together with indicative budgetary provisions related to knowledge management, capacity development, monitoring, evaluation and learning.

To summarise, the Gender Policy and Action Plan 2018–2020 aims to do the following: transition from gender-sensitivity to active gender-responsiveness to overcome historical biases; mandate project-level gender action plans in addition to broader gender assessments; outline clear requirements at the project inception, implementation, monitoring and reporting stages as well as in regard to roles and responsibilities; reaffirm the centrality of the gender goal (Goal 5) as a standalone goal and well as a cross-cutting goal across the Sustainable Development Goals (SDG) agenda; and to provide gender-responsive indicators to the Action Plan of the updated Gender Policy, together with indicative budgetary provisions related to knowledge management, capacity development, monitoring, evaluation and learning.

For instance, Table 1 shows GCF and UN Women’s recommendations for gender-responsive indicators to measure outcomes/impact in climate change interventions and climate finance that could possibly be incorporated.³³

Specifically to encourage women entrepreneurs, the GCF indicators include those at the overall impact level – “number of female entrepreneurs with adequate access to financing for low-carbon and climate-resilient investment,” to those at the specific outputs – for instance regarding business model and technology solutions – “Proportion of women-led businesses/small and medium enterprises engaged in design/manufacturing/maintaining/distribution of low-carbon and climate-resilient solutions,” and regarding access to finance – “Evidence of the type of financial incentives used to encourage women’s entry into the market for provision of low-carbon/climate-resilient products and services (e.g., finance packages; tax benefits and rebates; subsidies; pilot schemes; partnerships with financial institutions, the private sector or women’s associations)”.³⁴

The development of gender-responsive indicators is a step in the right direction; rigorous adherence to them could lead to galvanising the underutilised potential

Table 1 Gender responsive indicators at the impact/outcome level.

Well-being and livelihood	• Number and percentage of poor women and men with increased resilience to climate change (e.g., use of climate-resilient crops and farming techniques, improved land management, clean technologies, increased knowledge and strengthened networks on climate change issues, number/percentage of women-headed households with a resilient home) • Number/percentage of (female-headed) households/people with (no) access to low-carbon energy or transport solutions and infrastructure • Time saved in collecting and carrying water, fuel and forest products due to environmentally sustainable and climate change adaptation activities
Economic empowerment	• Number of female entrepreneurs with adequate access to financing for low- carbon and climate-resilient investment
Participation and decision-making	• Level of women's and men's awareness on women rights and rules for access to financial, natural and energy resources
Capacity development	• Number and percentage of women and men trained in energy-saving and sustainable agricultural technologies (e.g., adaptations to land management practices in marginal and fragile lands, adaptations related to changed rainfall patterns)

of women as change agents.

Moving Forward

Climate risks are not gender-neutral; therefore, climate finance cannot be gender-neutral either. To be efficient and effective, the global climate finance regime must recognise the disproportionate vulnerability of women along with their potential as agents of change.

To address the stubborn structural inequalities that leave women particularly vulnerable and threaten to widen existing gaps, climate finance must transition from being gender-sensitive to being gender-responsive. Current literature also proves that gender-responsive climate finance approaches are more successful and sustainable.

While gender considerations are gaining prominence in climate finance mechanisms, gaps remain. Mechanisms such as the CDM, which focus on large-scale projects, risk ignoring impactful but small-scale, community-based actions, and the potential of micro, small, and medium-sized enterprises in developing countries; it is in these latter that women are over-represented. To ensure optimal results, climate finance projects/programmes must ensure gender mainstreaming across all structures, programmes and procedures as well as within all phases of the project cycle – its design, implementation, monitoring and evaluation. Equally, the gender-balance and gender-expertise of the staff and advisory bodies of relevant institutions is crucial to ensuring that evaluations go beyond what is being funded towards how

it is being funded.

Lastly, it is important to connect the local with the global. Existing global climate funds must ensure robust stakeholder participation from developing countries to ensure beneficiary-centric outcomes. Similarly, national-level climate finance mechanisms must work in tandem with gender equality mechanisms such as gender budgeting. It is important, for instance, for climate action programmes to ensure that while women can be change agents with the right training, in no way should their disproportionate share of unpaid care and domestic work be further increased.

To be meaningful, gender considerations must go beyond being an “add on” in climate action programmes to being a core focus of global funds and national planning.³⁵

Endnotes

- 1 United Nations Development Programme, *Gender and Climate Finance: Asia and the Pacific*, December 2013
- 2 “World Poverty and Human Rights”, Carnegie Council for Ethics in International Affairs, March 2005
- 3 Schalatek, Liane, and Smita Nakhooda, *Gender and Climate Finance*, Overseas Development Institute, November 2016
- 4 United Nations Development Programme, *Gender and Climate Finance: Asia and the Pacific*, December 2013
- 5 Saran, Samir, and Vidisha Mishra, “Climate Change and Human Rights: Securing the Right to Life”, November 2015
- 6 Verma, Rashmi, “About 23 per Cent Girls Drop out of School on Reaching Puberty”, *DownToEarth (blog)*, January 2018
- 7 Dasra, *Dignity for Her - Empowering India's Adolescent Girls through Improved Sanitation and Hygiene*, March 2015
- 8 Macdonald, Rhona, “How Women Were Affected by the Tsunami: A Perspective from Oxfam”, *PLoS Medicine* 2, no. 6 (2005)
- 9 Huyer, Sophia, *Gender Equality in National Climate Action*, United Nations Development Programme, November 2016
- 10 Schalatek, Liane, and Smita Nakhooda, *Gender and Climate Finance*, Overseas Development Institute, November 2016
- 11 Hablezion, Senay, *Gender and Climate*, United Nations Development Programme, 2016
- 12 Ibid
- 13 Ibid
- 14 Green Climate Fund, *Updated Gender Policy and Action Plan*, Proceedings of Green Climate Fund Board Meeting, South Korea, Incheon, June 2018.
- 15 Schalatek, Liane, and Smita Nakhooda, *Gender and Climate Finance*, Overseas Development Institute, November 2016
- 16 Ibid
- 17 United Nations Development Programme, *Gender and Climate Finance: Asia and the Pacific*, December 2013
- 18 Ritchie, Hannah, and Max Roser, “CO₂ and Other Greenhouse Gas Emissions”, *Our World in Data*, May 2017
- 19 Schalatek, Liane, and Smita Nakhooda, *Gender and Climate Finance*, Overseas Development Institute, November 2016
- 20 Ibid
- 21 Bairiganjan, S., “Bringing Clean Energy to Rural India: A Case Study of the Bagepalli CDM Biogas Project”, Institute for Financial Management and Research, Centre for Development Finance, December 2008
- 22 United Nations Development Programme, *Gender and Climate Finance: Asia and the Pacific*, December 2013
- 23 Aguilar et al., *Roots for the future*, 2015

- 24 Schalatek, Liane, and Smita Nakhooda, *Gender and Climate Finance*, Overseas Development Institute, November 2016
- 25 Green Climate Fund, *Updated Gender Policy and Action Plan*, Proceedings of Green Climate Fund Board Meeting, South Korea, Incheon, June 2018
- 26 Asian Development Bank, *Building Gender into Climate Finance*, July 2016
- 27 Hablezion, Senay, *Gender and Climate*, United Nations Development Programme, 2016
- 28 Schalatek, Liane, and Smita Nakhooda, *Gender and Climate Finance*, Overseas Development Institute, November 2016
- 29 Schalatek, Liane, "Can the Green Climate Fund (GCF) Set New Best Practices for Gender-Responsiveness? A Deep Dive", February 2018
- 30 Schalatek, Liane, "In Bonn & Beyond, Gender-Responsive Climate Finance Is More than Numbers", November 2017.
- 31 Ibid
- 32 Green Climate Fund, *Updated Gender Policy and Action Plan*, Proceedings of Green Climate Fund Board Meeting, South Korea, Incheon, June 2018.
- 33 Green Climate Fund, *Mainstreaming Gender in Green Climate Fund Projects*, August 2017
- 34 Green Climate Fund, *Mainstreaming Gender in Green Climate Fund Projects*, August 2017
- 35 Schalatek, Liane, and Smita Nakhooda, *Gender and Climate Finance*, Overseas Development Institute, November 2016

This monograph is focused on India for good reason: It will be the first large country that must transition to a middle-income economy in a fossil fuel-constrained world. An assessment of India's capacity to now leverage international financial flows and its ability to undertake a low-carbon transition can provide a reliable template for developing countries to emulate.



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