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Sustainable Infrastructure

New Chapter for China-LAC Infrastructure Cooperation

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Contents

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Introduction

In recent years, a growing emphasis has been given to the impact of infrastructure on economy，society and environment as well as to the sustainability of infrastructure among countries of the world. The 2015 G20 Summit identified infrastructure as one of the five priorities of sustainable development. Sustainability institutions in the United Kingdom, the United States, Australia, Netherlands, and Switzerland and some international industry associations have also published a few standards for sustainable infrastructure. It can be foreseen that sustainable infrastructure will become a new trend in the global infrastructure market.

The Inter-American Development Bank (IDB), a major multilateral financial institution that drives the infrastructure development in Latin America, has a dedicated strategy on *Sustainable infrastructure for competitiveness and inclusive growth,*[1] which has a guiding function in the planning and operations of the bank. As a nationwide organization of international contractors, China International Contractors Association (CHINCA) has been advocating the concept of sustainable development for years to boost the comprehensive competitiveness of its members. Since 2014, sound communications and exchanges have been maintained between CHINCA and IDB regarding the issues of social safeguards, environment and sustainable infrastructure and consensus on many topics has been reached. To further promote this partnership in the field of sustainable infrastructure development and investment, CHINCA and IDB signed a MOU of Cooperation in June 2015.

This publication represents the latest achievement of CHINCA and IDB and a new step for both parties to exchange over infrastructure sustainability. With a shared vision to promote sustainable infrastructure, CHINCA and IDB will intensify collaboration and offer an impetus and guidance for Chinese contractors to invest in and undertake sustainable infrastructure projects in Latin America and the Caribbean and the rest of the world in the future.

Sustainable infrastructure is a very broad topic and the books, treatises, and methodologies on this topic abound. The purpose of this publication is not to give a complete overview but to provide orientation from a practical and process-oriented perspective. It can only be a sketch of recent arguments and trends concerning sustainable infrastructure as they emerge in the discussion of multilateral development banks, international organizations, and climate change–related think tanks.

1. China-LAC Infrastructure Cooperation

China and Latin America and the Caribbean (LAC) countries have been strong partners with deepened bilateral trade and economic cooperation in recent years. Between 2000 and 2015, trade between China and LAC countries expanded 22 times. President Xi Jinping's commitment to generating US$500 billion in bilateral trade and US$250 billion in direct investment in the LAC region over the next decade has helped maintain this momentum, positioning China as the largest trading partner and creditor of several LAC countries and the region's second largest investor.

[1] IDB 2014.

Across LAC, untapped opportunity awaits. Considering the population growth, increasing urbanization, and flourishing middle class that define LAC, the region faces an infrastructure gap. To improve existing subpar infrastructure and meet new demand, it is expected that LAC must double or triple infrastructure investments for at least two decades to meet development needs, and must increase investment to about 5% of GDP.

This is where China can come in. China has invested more than any other country in its own infrastructure, accumulating useful experience in transport, energy, equipment manufacturing, and more. Also, China has engineering and construction companies with world-class capacities in construction and technology. This capacity makes China an attractive partner for LAC in this sector. Through the successive launch of the Special Loan Program for China-Latin America Infrastructure Project, the China-LAC Cooperation Fund, the China-LAC Industrial Cooperation Investment Fund, and other new financing platforms, China and LAC will see new opportunities for infrastructure cooperation. Latin America has gradually become a hot destination for Chinese contractors to build and fund infrastructure projects.

According to China's Ministry of Commerce, the contract amount signed by Chinese enterprises for projects contracting in the LAC region reached US$18.16 billion in 2015, with the turnover, US$16.4 billion, representing 10.3 and 24.4% increases year on year. By the end of 2015, Chinese contractors had recorded a turnover of US$74.5 billion in total in the region. Power, transport, telecommunications, housing, and petrochemicals are major areas for infrastructure cooperation. In addition, Chinese enterprises have concluded contracts for public-private partnership programs in Columbia, Ecuador, and other Latin American countries to mark a new breakthrough in China-LAC infrastructure cooperation.

Both CHINCA and the IDB are now paying special attention to the investment and construction of sustainable infrastructure. Such projects can offer a strong impetus to the local economic development, benefit local communities, and promote balanced economic, social, and environmental development in LAC region through reasonable use of natural resources, pollution reduction, and eco-environment protection. We believe that the China-LAC partnership on building and funding sustainable infrastructure will help open a new chapter in bilateral cooperation.

2. The Importance of Infrastructure for Development

Infrastructure refers to the basic structures that facilitate and support economic activity. Thus, infrastructure is about physical installations that provide services to the population, businesses, and state institutions. This conventional approach, which focuses on hardware, is more and more replaced by the more modern concept of infrastructure as a means to provide services—an important element of the IDB infrastructure strategy.[2] It is widely recognized that these infrastructure services should be cost-effective, reliable, and affordable and that they are critical for sustainable development. This is reflected throughout the Sustainable Development Goals (SDGs) (see goals 7, 9, 11, and 13, on clean energy, infrastructure, sustainable cities, and climate action).

Providing universal access to infrastructure services such as water, sanitation, transport, energy, and communications is a major objective of many governments, as these are crucial for human development.

[2] Ibid., p. 16.

Infrastructure deficits in these areas directly affect people's living conditions and life expectancy and deprive them of the right to development, which is why infrastructure services are indispensable for achieving the SDGs related to health, education, gender, and poverty. In addition, deficient infrastructure also has economic costs and reduces growth.

3. The Concept and Principles of Sustainable Infrastructure

There are many definitions and sets of principles for sustainable infrastructure, and each one puts emphasis on different aspects. This is due to the specific circumstances in which these concepts were developed and the purposes they serve. Sustainable infrastructure is often conceived as a rather vague and complex term combining the concept of infrastructure and the concept of sustainability. It becomes more tangible in a concrete project context. There, sustainable infrastructure can be understood as a method or an approach to make a given infrastructure project more sustainable.

The conceptual framework or set of principles[3] for a concrete project can be arranged along the classic concept of sustainability: the sustainability triangle with its three dimensions of financial and economic, social, and environmental sustainability, with governance as the base for the triangle.[4] (See Figure 1.) The following principles give guidance for adequate governance and describe objectives for economic, environmental, and social issues that should be prioritized and addressed in an integrated fashion in order to make an infrastructure project more sustainable.

Figure 1. Sustainability Principles

[3] We follow the approach of the draft principles for sustainable infrastructure prepared by Graham Watkins of IDB for the IAIA conference on sustainable mega-infrastructures in Panama in December 2015.
[4] This arrangement follows the traditional sustainability approach that was proposed in 2008 by the World Bank; see World Bank 2008c and 2008d, especially slide 22.

Governance

As the main purpose of infrastructure is to provide services to the public, governments must organize the process of prioritizing projects and deciding on the scale and siting of the infrastructure in a transparent and participatory way. Moreover, the infrastructure project needs to be embedded into cross-sectoral and regionally integrated planning processes to harmonize the use of natural resources, land use planning, and the project's impacts. If planned and implemented in a manner characterized by sectoral and regional silos and separated responsibilities, infrastructure projects run a high risk of leading to significant inefficiencies, cost overruns, project terminations, or even destruction of infrastructure. For example, without proper cross-sectoral upfront planning, a functional road might be unnecessarily flooded because of a conflicting hydro project. Also, the function and design, as well as the access and the cost sharing for infrastructure projects, are critical questions that have to be addressed upfront and discussed with stakeholder groups. Experience shows that early stakeholder involvement is not a time- and cost-intensive hurdle but rather a key requirement for the successful completion of projects on time and on budget.[5] This is why proper infrastructure governance is the foundation of sustainable infrastructure. It predetermines the possible options of an infrastructure project as well as the trade-offs between the different sustainability dimensions.

Thus, in the field of governance:

- Projects should be developed and designed in an integrated planning process that describes their strategic need, ensures integration with upstream and downstream facilities, ensures coherence with the needs and values of people, and takes into account cross-sectoral synergies and inter-dependencies.
- Projects should be managed in a context of good local, regional, and national governance, including ensuring transparency, accountability, measurability, and traceability of results.

Environmental Sustainability

The environment is most commonly identified with the concept of sustainability and forms inarguably a very important aspect of it. It is worthwhile mentioning that the principle of resilience is also in this category. Though resilience could also be seen as an aspect of financial and economic sustainability, it is better positioned here because resilience in this context refers to the physical project being resilient against adverse environmental conditions (and not the asset). Listed under financial sustainability, it could be addressed solely with an insurance solution, whereas here insurance is only a part of the solution.

Thus, in the field of environmental sustainability:

- Landscapes and ecosystem integrity and functions affected by projects need to be maintained or enhanced through the application of the mitigation hierarchy to avoid and minimize impacts and rehabilitate or compensate for any residual impacts as agreed with those affected by the project.
- Resources—including land, energy, water, and materials—should be used efficiently, reused, or recycled to the extent possible and in a manner that does not jeopardize their long-term availability.

[5] See IFC 2007 and OECD 2014, p. 113f.

- Solid wastes, hazardous materials, damaging air emissions including greenhouse gases, and noise should be minimized using the best available technologies.
- Projects should be designed, constructed, and operated in such a way as to ensure resilience and adaptation to natural disasters and climate change.

Social Sustainability

As infrastructure is mostly financed by taxpayers' money, infrastructure should obviously be "by the people and for the people." Yet the social aspect of infrastructure development tends to be often neglected. Experience from Latin America shows that proper consultation and participation processes are essential to prevent conflicts with the population and to mitigate project risk. Mining companies in the region have experienced serious delays in construction, interruption of operation, and even mine closures in the last two decades. Because of these experiences, companies have developed more-sophisticated systems to interact with relevant stakeholder groups and are now aware that they need to go beyond obtaining the formal government and environmental licenses. They need a "social license" to operate as well.[6] This also applies to large infrastructure construction.

Thus, in the field of social sustainability:

- Projects should be planned, developed, and implemented taking into account the views and concerns of affected people; effective, easily accessible, and well-disseminated mechanisms to redress grievances should be established.
- The health and safety of workers and communities should be protected, labor rights should be respected, and workplace gender-equality issues should be addressed; to the extent possible, workers should be drawn from local populations.
- Projects affecting or benefitting indigenous communities should be adapted to their specific social and cultural conditions, while including provisions to respect their collective rights, avoid negative impacts, and increase opportunities for development.
- The incomes and living standards of affected people who are physically or economically displaced should be improved or at least restored, cultural heritage should be protected, and gender discrimination should be avoided.

Economic Sustainability

Multilateral developments banks traditionally put much emphasis on the economic aspect of sustainability. This is fully legitimate as banks have to focus on cost-benefit aspects. However, there is often also a "social return" of projects that in many cases cannot be properly measured in traditional cost-benefit analyses. Nonetheless, realistic and transparent cost-benefit analyses are very useful, as they are an important precondition for rational decisions and prioritizations of infrastructure projects. The precondition for this is a transparent attribution of economic values to benefits, negative consequences, costs, and risks as well as a transparent way of defining the underlying assumptions. The Zofnass Program for Sustainable Infrastructure of the Graduate School of Design Harvard University developed

[6] See Davis and Franks 2014 and Franks et al. 2014.

within its ENVISION™ methodology an economic tool to define these values and assumptions in a transparent process involving all relevant stakeholders.[7]

Moreover, in the field of economic sustainability, the development and prioritization of projects should be guided by the following principles:

- Projects should efficiently increase access to high-quality, cost-effective services supporting sustainable and inclusive growth to meet the needs of target populations.
- Projects should be economically and fiscally viable, technically feasible, and attractive for innovative financial mechanisms, including those harnessing private capital.
- Projects should incorporate provisions to maintain the assets throughout their lifecycle to provide reliable and safe services over the long term.
- Project design should ensure the services provided are paid for by the users to reduce incentives for overuse and asset deterioration; however, special programs should be designed and implemented to facilitate access to all and avoid barriers to these services, particularly for poor and vulnerable groups.

These principles are aspirations rather than regulations. They give general guidance to what can and should be achieved when planning and implementing an infrastructure project in order to make it "sustainable." They provide orientation for the responsible decision maker when designing or deciding on projects.

4. The Role of Sustainable Infrastructure in Addressing Today's Urgent Global Challenges

The year 2015 was characterized by three big international events that underlined the importance of the global sustainability agenda: The Addis Ababa conference on financing for development in July reaffirmed the U.N. commitment to establish a forum to bridge the infrastructure gap and to invest in sustainable and resilient infrastructure.[8] The U.N. Summit in September in New York agreed on a new set of goals for the year 2030, the Sustainable Development Goals, which depend on and are closely linked with sustainable infrastructure.[9] And finally the 21st Conference of the Parties (COP 21) of the United Nations Framework Convention on Climate Change—the Climate Summit in Paris—in December set out a pathway for reducing greenhouse gas emissions within the national frameworks, which has profound consequences for national infrastructure development.[10]

These three conferences reflect today's three central challenges for the world community:[11]

- The financing for developing summit dealt with the problem how to secure sustainable long-term growth. But currently we are faced with an anemic global economic recovery and uncertain long-term growth prospects. The slowdown in global trade and decline in commodity markets has

[7] For the tool, which is currently published only for academic purposes, see http://economictool.zofnass.org/.
[8] See points 14, 33, and 47 of UN 2015a.
[9] See UN 2015b; see especially Goal No. 9 and Figure 2 here.
[10] See UNFCCC 2015.
[11] See Bhattacharya 2016, slides 3 and 4. See also New Climate Economy 2014 and 2015, a project of the Global Commission on the Economy and Climate.

increased the volatility in global markets, has decreased confidence in emerging markets, and hit some major emerging markets dramatically. So the challenge is, How to reignite global growth?

- The U.N. Summit set ambitious goals for the elimination of poverty and securing a better life for all. These goals are principally attainable but have become much more challenging in the current global environment as public finances are strained and growth perspectives dimmed. So the challenge is, How to deliver on the Sustainable Development Goals?
- Though the Paris Agreement during COP 21 was the long-awaited turning point in the climate negotiation process and forms the basis of new international, cooperative, and long-term action on climate change, it is also clear that commitments to date will not be sufficient to meet climate goals. So the challenge is, How to secure sufficient emission reductions to avert catastrophic climate change? Or to put it simpler and clearer, How to protect the future of the planet?

How can these challenges be tackled? The best way to address them is with sustainable infrastructure: Delivering on sustainable infrastructure is at the center of all three challenges.[12]

- Investing in sustainable infrastructure will boost global demand and activity in the short term and lay the foundations for sustained long-term growth. This is particularly important as the limitations of monetary, fiscal, and exchange rate policies have become obvious in the last few years. Thus infrastructure investments can serve in most of the economies as a very valuable method to foster growth and can affect the real economy.
- Sustainable infrastructure is critical to the attainment of the SDGs through the opportunities that it creates for inclusive growth and access to basic services. In order to deliver these important development functions, infrastructure has to be planned in an overarching regional and cross-sectoral context, developed in a transparent way and with equal respect for all three sustainability goals.
- More than 60% of carbon emissions worldwide emanate from investments in and the use of infrastructure. Thus many Intended Nationally Determined Contributions, which play a crucial part in the Paris agreement, can only be achieved by mobilizing additional investment to improve the national infrastructures.

The New Climate Economy Project points out the dimension of this necessary transformation:

> *The next 15 years will be critical, as the global economy undergoes a deep structural transformation. It will not be "business as usual". The global economy will grow by more than half, a billion more people will come to live in cities, and rapid technological advance will continue to change businesses and lives. Around US$90 trillion is likely to be invested in infrastructure in the world's urban, land use and energy systems. How these changes are managed will shape future patterns of growth, productivity and living standards.*[13]

As infrastructure assets have a very long lifetime, it is crucial to shift rapidly to low- carbon and sustainable solutions in order to avoid the "lock in" of high-carbon technologies:

[12] Bhattacharya 2016, slides 3 and 4.
[13] New Climate Economy 2014, p. 8.

Managed well, the additional investments in infrastructure needed to make the transition to a low-carbon economy will be modest. The infrastructure requirements for a high-carbon economy, across transport, energy, water systems and cities, are estimated at around US$90 trillion, or an average of US$6 trillion per year over the next 15 years. By combining renewable energy with reduced fossil fuel investment, more compact cities, and more efficiently managed energy demand, low-carbon infrastructure will increase investment requirements by only an estimated US$270 billion a year. These higher capital costs could potentially be fully offset by lower operating costs, for example from reduced expenditure on fuel. Investing in a low-carbon economy is a cost-effective form of insurance against climate risk.[14]

Well-designed, high-quality infrastructure—which is essentially sustainable infrastructure—can thus be the solution for these three challenges: It can be a global driver for economic growth, for alleviation of global poverty, and for climate-friendly, low-carbon and resilient development. (See Figure 2.)

Figure 2. Sustainable Development Goals and Their Relation to Sustainable Infrastructure

Source: Bhattacharya 2016, slide 5.

[14] Ibid., p. 9.

5. The Role of Governments as Drivers of Sustainable Infrastructure

Governments have the central role for infrastructure investments, either by commissioning projects themselves or by providing funding for preparation of projects or public-private partnership arrangements. In any case public funding is a crucial precondition for mobilizing private investments in this sector.

Amar Bhattacharya, Jeremy Oppenheim, and Nicholas Stern assess the situation for infrastructure investments as highly deficient:

> *In many countries public investment is at historically low levels. In the EU, public investment is estimated at less than 2 percent of GDP, notwithstanding the ability of governments to borrow at rates close to zero. With the exception of China (and a few others), public investment rates in most developing countries are significantly below the 6–8 percent of GDP that would be consistent with growth rates of 5 percent or more per annum. Given that public investment is typically in excess of 50 percent of infrastructure spending (and can be as much as 80 percent) and can play an important role in crowding-in private sector involvement and finance (through various forms of public private partnerships), shortfalls in public investment have negative multiplier effects. Raising public investment will require increasing fiscal space, which is a severe constraint in many developed and developing economies.*[15]

On the other side, governments define the framework: Laws, policies, and regulations can function as an obstacle, an enabler, or even a promoter of infrastructure investments. Governments define the degree of sustainability of a project with their rules on the general framework and its project-specific decisions. These framework conditions have to be set transparently, have to allocate risks and burdens rationally, and have to be stable for the long term in order to mobilize private sector investment into the infrastructure sector. But this is often not the case:

> *Weak national infrastructure plans, and cumbersome planning machinery, create major costs for project developers and exacerbate problems of corruption. As a result of weak institutional capacities and planning inefficiencies, infrastructure projects are subject to endemic delays and cost over-runs, typically between 20–50 percent of project costs, which in turn increases risks to developers and raises financing costs.*[16]

Cities in the developing world especially need new ways to access international capital, as they are the places where the infrastructure upgrade is most urgent:

> *Much of the projected infrastructure investment will take place in cities, yet most cities in the developing world cannot access financing. In fact, the World Bank has found that only about 4 percent of the 500 largest cities in developing countries are deemed creditworthy in international financial markets, while only 20 percent are deemed creditworthy in local markets. This will need to change over the next 15 years to achieve necessary public investment in infrastructure. Given the magnitude of investments that will need to be undertaken over the next 15 years, a sound but flexible approach will need to be taken*

[15] Bhattacharya, Oppenheim, and Stern 2015, p.12.
[16] Ibid., p.12.

> *towards debt management and debt sustainability. This scale of investment cannot be undertaken without debt financing playing a significant role; in this, what matters more is the **quality** of the investments that are financed, and not the level of debt that is financed.*[17]

The principles for sustainable infrastructure outlined here help to achieve this much-needed quality of investments. This is because transparent, multisectoral, and regionally integrated governance can secure better planning and more efficient execution of infrastructure projects. The three pillars of sustainability help to structure the process of rational, transparent, informed, and consensus-based decisions on the infrastructure project and the necessary trade-offs. It helps prevent the frictions and setbacks caused by neglecting social and environmental sustainability aspects, and thus it reduces uncertainty for policy makers and investors.

6. The Role of the Financial Sector as Investor in Sustainable Infrastructure

For over a decade there has been a growing trend in the financial sector to actively address and manage sustainability of investments regarding not only finance but all three sustainability dimensions. Some milestones along this way are the following:

- The launching of the Dow Jones Sustainability Indices in 1999 and their continuous evolution.
- The Carbon Disclosure Project of 2000 and its growing importance.
- The Equator Principles of 2003 and their dissemination.
- The Principles for Responsible Investment that were launched by the U.N. Secretary-General in April 2006.[18]

The creation and implementation of these sustainability assessments, transparency initiatives, and business standards show that financial institutions value the systematic monitoring and assessment of sustainability, as it increases transparency and mitigates risk in investment decisions. The recent trends in responsible investment are supported by a growing number of impact investors. The interplay of these concepts is shown in Figure 3.

[17] Ibid., p.12f.
[18] For an update on the recent state of the Principles for Responsible Investment, see PRI 2016b and 2016c.

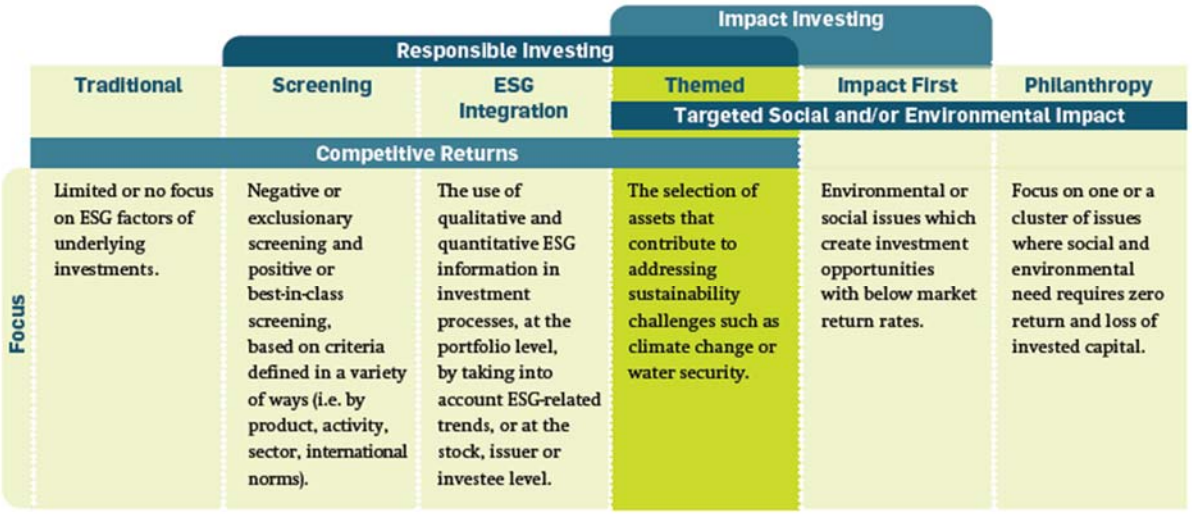

Figure 3. The Spectrum of Responsible and Sustainable Investment Concepts.
(Source: PRI 2015. p.16, Adapted from Bridges Ventures 2012)

In addition to this general trend toward sustainability in the financial sector, there are several more-specific reasons to address the sustainability of infrastructure projects:

- Increased attention of national governments to environmental, social, and governance (ESG) issues.
- Internal requirements for better due diligence of ecological and social risks of an infrastructure project in order to limit financial risks.
- Increased interest in infrastructure as a target sector for future investment.

Increased Government Focus on Environmental, Social, and Governance Issues

Regulators such as national governments play a pivotal role in allowing and stimulating the financial sector to finance the transition to sustainable infrastructure investments. In the last two decades, risks originating from neglecting environmental, climate change, and social topics have come to the fore. Many governments, financing institutions, and investors are therefore giving more attention to these issues and perceive them as risks that have to be taken into account when doing business. Some national regulators are already addressing these risks with voluntary or mandatory sustainability reporting requirements. Here are some examples.

- Many countries have moved forward in establishing green bond and green credit guidelines. The *Sustainable Banking Network for Regulators* of the International Finance Corporation promotes this dialogue of regulators on green bonds and sustainability practices. It has members from Bangladesh, Brazil, China, Indonesia, Lao PDR, Mongolia, Nigeria, Peru, Thailand, and Vietnam.[19]

[19] See IFC 2016.

- China has been one of the frontrunners in this process: The People's Bank of China launched its green bond directive in December 2015. This is an important step for promoting sustainability criteria and practices in the Chinese financial sector.[20]
- In 2014, the Central Bank of Brazil implemented a regulation that establishes guidelines for financial institutions to consider the bank's "degree of exposure to the social and environmental risk of the activities and transactions of the institution." This regulation also requires the bank to publicly disclose its environmental and social risks as part of the market discipline disclosure rules of Pillar 3 of Basel III.[21]
- The Prudential Regulation Authority (PRA) of the Bank of England is responsible for the supervision of the insurance sector and focuses on environmental risks. Climate change is analyzed as part of systemic environmental risks, especially as insurance regulation is an area that needs to consider a long-term horizon. Thus PRA published the results of an analysis on the exposure of insurance companies to climate change–related risks in September 2015.[22]
- The Australian Prudential Regulation Authority (APRA) supervises individual financial institutions by establishing and enforcing standards for a stable, efficient, and competitive financial system.[23] Under the Financial Sector (Collection of Data) Act 2001, investment banks must provide statistical information to APRA. APRA has not made reporting on environmental, social, and governance issues mandatory. However, pension funds are expected "to demonstrate appropriate analysis to support the formulation of an investment strategy that has an ESG focus."[24]

Internal Requirements

Investors are increasingly incorporating sustainability in the form of ESG issues into their investment decision-making processes as a way of identifying risks and opportunities. As an indication of this trend, more than 1,330 investors, representing approximately US$45 trillion in assets under management, have signed the six United Nations–supported Principles for Responsible Investment. These principles cover different approaches for incorporating ESG issues. The Principles are accompanied by a reporting framework through which each signatory reports annually on its progress in implementing the principles.[25]

These practices have positive effects on the bottom line: A study of the consultancy firm Mercer reviewed 36 scientific studies on the relationship between environmental, social, and governance factors and financial performance. They concluded that 20 studies found a positive relationship and only 3 studies showed evidence of a negative relationship.[26] In June 2010 a research report of Deutsche Bank concluded that:

> *There are a number of reasons why financial, environmental and social objectives can be consistent with each other and consideration for ESG criteria can increase shareholder*

[20] See WRI 2016 and Amin, Shin, and Holmes 2014.
[21] See PRI 2015, p. 17.
[22] See Prudential Regulation Authority of the Bank of England 2015.
[23] APRA 2010, p. 3f.
[24] APRA 2013.
[25] See PRI 2015, p. 14.
[26] Mercer 2009.

> *value. Moreover, it is likely that the avoidance of environment-related and social risks can reduce the company's reputational risk and its exposure to claims for damages.*[27]

According to the latest Responsible Investment Benchmark Report of Australia, in 2015, there has been a strong uptake of responsible investments by banks and others investors in Australia. This increase of responsible investments is attributed to three key drivers: poor management of ESG issues has an impact on shareholder value; growing demand from consumers, activists, and civil society groups to comply with certain ESG standards; and increasing awareness by fiduciaries that consideration of ESG issues is an important element of their responsibilities, particularly in light of exacerbating trends with broad and wide ranging investment implications, such as climate change.[28]

Increased Interest in Investing in the Infrastructure Sector

The infrastructure sector was for a long time not interesting for institutional investors. This has changed. In a 2013 study, McKinsey points out that US$2.5 trillion of additional infrastructure financing might be available by 2030 if institutional investors can meet their target allocations in the infrastructure sector.[29] The low interest rates in most industrialized countries have further increased the attractiveness of infrastructure assets. Hence, the amount of capital available for infrastructure investments should currently be even higher. Much of this capital originates from pension funds and sovereign-wealth funds.

In general, pension funds and sovereign-wealth funds act with a long-term perspective, as they are often investing in order to fund liabilities that are multigenerational in nature (for example, funding pensions 30–70 years in the future). As the revenues from other asset classes are shrinking because of the low interest rates, investing in infrastructure becomes more attractive for this class of investors—especially as many of them look for predictable, long-term cash flows and are willing to stay invested over the lifetime of a project.

In order to manage the risks of such a long-term investment, ESG-related risks must be minimized. The sustainable infrastructure approach can deliver projects with such a risk profile. But addressing only the project level is not sufficient. Institutional investors with such a long time horizon need a consistent, predictable regulatory framework. As their time frame is on the order of quarter centuries, the regulatory framework has to transcend any given government, which may only be around for 5–10 years.

> *Policy uncertainty is a major constraint for infrastructure developers, especially when private capital is required. Typical infrastructure assets take 3–7 years to build, with payback periods that extend well beyond 10 years. This makes investment returns highly sensitive to regulatory/policy risks during the construction and operating phases of the project.*[30]

National governments and jurisdictions that can demonstrate consistency and predictability over a period of time are in a good position to attract capital for their infrastructure projects: The United Kingdom, Australia, and Chile are good examples for this. It is not surprising that they have also introduced

[27] Schmidt and Weistroffer 2010.
[28] Responsible Investment Association Australasia 2015, p. 4.
[29] See McKinsey Global Institute 2013, p. 4.
[30] Bhattacharya, Oppenheim, and Stern 2015, p.13.

standards for sustainability in their respective jurisdictions and have a leading role in sustainable Infrastructure in their regions.

Thus in order to create benefits for the investors, the concept of sustainable infrastructure cannot stop on the project level. It has to reach out to the political and regulatory system of a country and help to close the gaps and mitigate the risks that deter possible investors.

7. Emerging Assessment Approaches for Sustainable Infrastructure in the Financial Sector

The rising interest of investors in sustainable infrastructure has led to increased activities in the field of assessment approaches. At the moment it is not clear whether these approaches can establish themselves as valuable standards, as they are still in a very early stage. This paper looks at two assessment approaches for sustainable infrastructure that are driven by the financial sector:

SuRe® was developed by Global Infrastructure Basel (GIB) Foundation. GIB is a Swiss foundation based in Basel and founded in 2008. It is promoting sustainable and resilient infrastructure through sustainable infrastructure design and financing on a global scale. GIB launched SuRe® as its own sustainable infrastructure standard in December 2015. GIB sees SuRe® as applicable to projects across different types of infrastructure. The standard has a set of three dimensions—governance, society, and environment—with four to five themes for each dimension and a certain number of criteria that serve as indicators.

In its overall design the SuRe®-standard resembles the approach of Envision™ (which has five dimensions). It relies on independent verification and certification by third parties. It is meant to facilitate the clear communication of a project's macro-benefits while enabling project comparability.[31]

Another emerging standard for sustainable infrastructure comes from the real estate sector. This is still in a very initial stage, but it already has support from eight global institutional investors with US$1.5 trillion in assets under management. The goal of this initiative is to standardize and advance the assessment of ESG factors in infrastructure investments. The founding investors have recruited the team of the **G**lobal **R**eal **Es**tate **B**enchmark (GRESB) to develop this new standard. GRESB has already developed a benchmark that is now used by over 700 real estate funds.

The new standard will benefit infrastructure fund managers, operators, and assets alike. It will reduce the work of investees in responding to ESG questionnaires and facilitate the sharing of best practices within the same sector. It assesses ESG at the organizational level using questions relating to management, due diligence practices, policy and disclosure, and stakeholder engagement. It also addresses ESG at the sector and asset levels by looking at practices related to sustainability benchmarking, monitoring, performance, and engagement.

At the moment it is difficult to assess whether one or both of these assessment approaches will become established successfully as a new standard. But it is clear that these two initiatives reflect the interest of

[31] GIB 2015a and 2015b.

the financial sector in enhancing, promoting, and monitoring sustainable practices on the portfolio or company level.

8. IDB Approaches to Assessing the Sustainability of Infrastructure Projects and Experiences

As a development bank, the IDB has for a long time been committed to making its infrastructure investments more sustainable. The safeguard policies and systems of the Bank have been in place for more than 10 years. These policies define requirements that must be met by project owners in order to be eligible for financing. Many specific policies and strategies were developed in the following years. The Strategy for *Sustainable infrastructure for competitiveness and inclusive growth* in January 2014[32] was another crucial step. Thus the IDB promotes sustainable infrastructure by integrating sustainability in the project development of the Bank itself and engaging with the project sponsors. These projects include, among others, hydroelectric projects, coastal zone development projects, wind farms, and Bus Rapid Transit (BRT) systems.[33]

Reventazón Hydroelectric Project in Costa Rica

In Costa Rica, the IDB participated in the Reventazón Hydroelectric Project. Two Bank loans for US$450 million were approved in 2012. When it is completed in summer 2016, this 305 megawatt (MW) project will represent 10% of the country's installed generation capacity. The Bank project incorporated additional technical cooperation financing of US$466,000 to help enhance sustainability, particularly to focus on ecological connectivity in the Meso-American Biological Corridor, which the project's reservoir affected, and to establish one of the first aquatic offsets in Latin America and the Caribbean. Five specific levers increased the sustainability of this project:

- Integrating the energy sector, river basin, and land use planning to ensure sustainability.
- Working closely with knowledgeable local and international organizations involved in land and river use planning.
- Recognizing and compensating for residual cumulative impacts on rivers that result from hydroelectric projects.
- During the design stage, incorporating analysis and identification of the financial resources and institutional mechanisms to ensure long-term sustainability.
- Evaluating the institutional capacities of owners and construction firms to deliver broader sustainability outcomes.

Palmatir Wind Farm and Transmission Line in Uruguay

In Uruguay, the Palmatir Wind Farm and transmission line in Tacuarembó were supported with an IDB loan for US$41.7 million. The capacity of the wind farm is 50 MW; it consists of 25 turbines each with 2 MW capacity, 34 kilometers (km) of aboveground cables, and 20 km of subterranean cables. Nine main sustainability levers were applied here:

[32] IDB 2014.
[33] The following project descriptions are mostly drawn from the Annex in Watkins 2014.

- A project designed to generate jobs, transfer technology, and build capacity.
- A focus on community well-being.
- The inclusion of community feedback in decision making.
- Effective environmental and social management plans to address noise and electromagnetic fields in order to minimize impacts on health and gain the full support of the community.
- The protection of historical sites.
- A high degree of collaboration and stakeholder engagement (several public hearings were held, from which the expansion and repair of the local road network was coordinated between the project proponents and the local community).
- A project site that avoided areas of high ecological value.
- The minimization of water use.
- Adherence to international standards in the absence of national legislation relating to wind farms.

Bus Rapid Transport System in Bogota, Colombia

In Colombia, the city of Bogota established a BRT system in 1998 called TransMilenio and a Bike Path Master Plan to support non-motorized transport. The BRT can transport 1.2 million people each day. At the same time, the system reduced traffic fatalities in the city by 92%, travel time by 32%, and air pollutants by 40% in the first 12 months of implementation, while emissions per passenger were expected to decrease by 45% by 2015. The bike system includes 400 km of bikeways established since 1998, and bicycle use has grown from 0.5% in the mid-1990s to 5% in 2006. The costs per km were substantially reduced compared with using road transport. Seven main levers for increasing the sustainability of these infrastructure systems can be identified:

- Holistic and integrated planning approaches to transport infrastructure.
- A linking of public information and public accessibility to ensure high use and broad acceptance.
- Public communication approaches to shift public perceptions about public transport and infrastructure.
- Integration of incentives, public education, and regulation.
- Innovative public-private partnerships for financing.
- Political leadership and will.
- Stakeholder engagement and ongoing civil society participation.

Evaluating Sustainability in Projects

The IDB has also looked into assessment methodologies in the recent years. A broad set of methodologies are available for assessment and planning of sustainable infrastructure on the project level. Some of them are sector-specific (such as INVEST for the transport sector) or even technology-specific (such as the Hydropower Sustainability Assessment Protocol), while others are more general for infrastructure projects (such as CEEQUAL).

While the safeguards describe the minimum requirements that have to be met in every project in order to be eligible for financing by a multilateral development bank, the assessment methods for sustainable infrastructure allow a more comprehensive evaluation of the degree of sustainability of a given project.

For three years the IDB has been using the Envision™ methodology. Envision™ was developed in an alliance between the Zofnass Program for Sustainable Infrastructure at the Harvard University Graduate School of Design and the Institute for Sustainable Infrastructure of the American Public Works Association, the American Council of Engineering Companies, and the American Society of Civil Engineers.[34]

The Envision™ methodology covers distinct projects from different sectors and provides a holistic approach to support the adoption of sustainability solutions. That means that it addresses both whether the project is being done right and whether the project is the right project.

The framework of Envision™ includes five perspectives:

Quality of Life	quality of life, sustainable growth, local skills, health and safety, community development, mobility and access, cultural and historic resources, well-being, aesthetics, amenities, and space
Leadership	collaboration, stakeholder engagement, management, integration, and long-term planning and addressing conflicts
Resource Allocation	material use, using local sources, managing waste, energy management, and protecting water
Natural World	siting, preserving habitats, wetlands, productive lands, land and water management including storm water, contamination, biodiversity, invasive species, soils, and wetland functions
Climate and Risk	greenhouse gas emissions, climate threat, vulnerabilities, long-term adaptability, and resilience

As Envision™ has been applied by the IDB to several dozen pilots in transport, energy, water and sanitation sector, the benefits of an independent evaluation tool like this became obvious. An independent tool is clearer, more easily accessible, and not tied to one specific institution. It can be used as an assessment tool as well as an early planning tool. Applied in a very early project stage, the planning function can help leverage considerable sustainability potentials. Moreover, it provides a unified assessment framework: This enables a better and more systematic comparison across projects from different sectors and thus provides a good platform for organizational learning.

This is why IDB has chosen Envision™ to be used in its *Infrastructure 360 Awards.* This identifies, assesses, and rewards sustainable infrastructure investments financed by the private sector and public-private partnerships in IDB's 26 borrowing member countries in Latin America and the Caribbean.

In this competition, projects are evaluated according to the Envision™ Methodology, and the evaluation is then presented to an independent panel of renowned infrastructure, project development, and sustainability experts to choose the winner in each of the three categories: *People and Leadership Award*, *Climate and Environment Award*, and *Transformational Project Award*. Three rounds of competition have taken place since 2014. It has been a good way to disseminate the concept of sustainable infrastructure

[34] See Institute for Sustainable Infrastructure and Zofnass Program for Sustainable Infrastructure 2012; and Pollalis et al., 2012.

in the region and has especially increased the awareness for the benefits of integrating sustainability in an early stage of project planning.

9. CHINCA's Understanding and Practice of Sustainable Infrastructure

CHINCA is a nationwide organization of Chinese contractors, investors, and labor service providers with a presence in overseas markets. It represents some 1,000 Chinese companies that contribute to infrastructure construction in spheres including communications, power, housing, petrochemicals, telecommunications, and new energy in more than 100 countries. In 2015, China's new contracts for overseas infrastructure projects were valued at US$210.07 billion, representing a year-on-year growth of 9.5%. The turnover amounted to US$154.07 billion, an increase of 8.2%. Some 65 Chinese enterprises were among ENR's Top 250 International Contractors, recording a total business turnover of US$89.5 billion in overseas markets and making Chinese international contractors the worldwide champion in the international infrastructure sector.

After years in business, CHINCA and its members have come to understand that Chinese enterprises must assume social responsibility and operate with long-term sustainable development in mind in order to achieve long-term growth, and in order to contribute to the effective implementation of the "One Belt, One Road" initiative. Since 2015, "One Belt, One Road" and the international production capacity cooperation, two initiatives proposed by the Chinese government, have driven the development of major infrastructure projects. Guided by a belief in "co-consulting, co-constructing, and sharing," and the concept of "harmony, inclusiveness, and win-win cooperation," the "One Belt, One Road" effort aims to create a community that shares both interests and responsibilities. Because sustainable infrastructure is directly related to local economic development, social progress, and environmental protection, three themes which are in line with the principles of "One Belt, One Road," CHINCA intends to play an important role in promoting sustainability in infrastructure efforts.

Sustainable infrastructure is a necessary precondition for maintaining good relations with stakeholders in the long-term and achieving sustained mutual benefits. When participating in international infrastructure projects, enterprises must prioritize communication and coordination with stakeholders in host communities, taking into full consideration the potential socio-economic and environmental impacts of their projects. Meanwhile, they should deliver premium and efficient projects by optimizing design, introducing leading technologies, and creating local value, thus improving people's health and welfare as well as promoting local socio-economic development. In addition, these enterprises should place an equal emphasis on protecting natural resources and the environment. All of these efforts can combine to maintain harmonious relationships, and subsequently mutual benefits, with local governments, communities, and residents.

In addition, engaging in sustainability helps Chinese enterprises keep up with the evolving global infrastructure market. As previously noted, several countries have launched assessment standards for sustainable infrastructure in order to address capital shortages in the infrastructure market, mitigate investment-related risks, and encourage the broader participation of private funds. Because sustainability will remain an important trend in the global infrastructure market and a new requirement for enterprises engaging in international infrastructure construction, Chinese enterprises that participate in projects

funded by international financial institutions or institutional investors will need to embed the sustainability requirements into their design, construction, and operation process.

Additionally, Chinese enterprises have an opportunity to build a positive reputation and gain a competitive advantage in this area. Building sustainable infrastructure projects can position Chinese enterprises as responsible players committed to promoting economic development, safeguarding fairness and justice, and protecting the environment. But critically, operating sustainably over a long period in host countries requires extensive support from and engagement with actors including local governments, enterprises, media, and citizens.

CHINCA operates under the belief that sustainability can only be achieved if social, economic, resource, and environmental considerations are incorporated into the planning, design, construction, and operation of infrastructure projects. Medium- and long-term impact and resilience to external challenges must also be taken into account. Specifically, the following aspects must be considered:

- ***Society:*** Projects should offer equal employment opportunities and fair treatment to all employees regardless of nationality, race, religion, or cultural background. Projects should also strive to improve local residents' quality of life, and minimize negative impacts on society in terms of public security, health risks, noise, light pollution, and hazardous wastes, among others. Finally, projects should improve community mobility and protect historical and cultural landmarks.
- ***Economy:*** Companies should undertake high-quality infrastructure projects and maximize these projects' stimulating effects on the local economy, meet growing requirements, create more jobs, and support synergic development with peripheral industries.
- ***Resources and Environment:*** Projects should minimize the consumption of natural resources, and use renewable, durable, and adaptable materials. They should also prioritize local procurement, properly dispose of materials, increase energy efficiency, and minimize potential damages to the natural ecosystem through better site selection. Finally, projects should make effective use of rainwater and limit water pollution, reduce inefficient usage of arable land, take into consideration any impacts on soil, reduce GHG emissions and waste, and fully preserve biodiversity.
- ***External Challenges:*** Projects should develop resilience against natural disasters (e.g., earthquakes, floods, and other extreme weather events) and adaptability to long-term external requirements and climate change.

The below section describes two examples of Chinese enterprises engaging in sustainable infrastructure construction. These companies have practiced sustainability in terms of employment promotion, local economic development, and green engineering and landscaping.

Venezuela: El Vigia Power Plant

To address a power shortage in Venezuela, China CAMC Engineering Co., Ltd. (CAMCE), a CHINCA member, signed a joint agreement with Venezuela's CORPOELEC to provide engineering services to a 570 MW combined-cycle power plant, three supportive substations, and a 56 km transmission line. Located in the El Vigia City suburb in the state of Merida State, this project has significantly improved the severe electricity shortages in western Venezuela and benefited more than 160,000 households. Over 2

million people have become indirect beneficiaries of improvements in local industry, agriculture, services, and livelihoods as well. To date, this project has engaged over 1,000 local workers and created more than 5,000 direct and indirect jobs, playing an important role in promoting local employment. All building materials and some equipment were supplied by local companies, with the rate of local procurement reaching 36%. During project implementation, CAMCE contributed 1.8% of the contract price to promote public welfare in the area. CAMCE also upgraded roads around the plant to improve the traffic conditions for local residents, and donated bicycles to local schools to facilitate students' travel.

Hong Kong: Downtown Road Improvement

Zhen Hua Engineering Co. Ltd. of China Harbour Engineering Company Limited, a CHINCA member, designed and built the downtown section of the Tuen Mun Road improvement project. Located in downtown Hong Kong, the project is working to improve urban quality of life by using quality environmental technology. As such, the contractor used technology to optimize the aesthetic design of the noise barrier, striving to ensure it fit neatly into its surroundings and minimized adverse environmental and visual impacts. The company focused its design efforts on a combination of landscape, environmental protection, and green engineering, working to adopt natural lights and transparent, light-weight architectural design. This not merely increases sunlight penetration and energy savings, but also improves the health of plants used for landscaping. The company summarized the key elements of their environmentally-friendly landscaping technique, which include:

- Use of environmentally-sound recycled waste (shrimp and crab shells) as chitin organic fertilizer, which contains no heavy metals or chemical additives but has long-lasting nutrients that help to kill and reduce nematode eggs, resist fungus and mildew, and improve resistance to pathogenic bacteria;
- The selection of short and slow growing perennial plants, as well as low-maintenance plants with tolerance to sunlight, heat, drought, wind, and shade; and
- The use of a solar-powered smart wireless sprinkler system and automatic section drainage system, effectively reducing water for irrigation and monitoring the allocation of water sources.

In sum, the project deployed approximately 10,000 m2 vertical green panels and noise enclosures with specific themes, as well as a green roof measuring approximately 20,000 m2, which effectively eases traffic jams in Tuen Mun area, and creates an aesthetically-pleasing environment for drivers. The project was well-received by the Hong Kong SAR government for its eco-friendly technology.

10. The Role of CHINCA in Promoting Sustainability

Since 2007 CHINCA has been helping its members to fulfill social responsibilities and enhance sustainability as it pertains to such issues as project quality and safety, rights and interests of employees and customers, supply chain management, fair competition, environmental protection, and community development. CHINCA's efforts in this regard include but are not limited to:

- The organization of seminars, forums, and training sessions through which Chinese companies can promote the concept of sustainable development;

- The organization of such activities as “CSR Gold and Silver Medal Competition” and the industry-wide corporate social responsibility performance assessment, which selected 150 exemplary model companies;
- The publication of reports, including three editions of “Collections of Best Corporate Social Responsibility Practices of Chinese International Contractors, which provide models and examples for CHINCA’s member companies to follow;
- The publication of the “Guide on Social Responsibility for Chinese International Contractors” in 2010, setting forth the first industry standards ever published within the industry in China;
- The publication of “Operational Manual for the Guide on Social Responsibility for Chinese International Contractors” in 2015 to set in place clear guidelines for social responsibilities and sustainable development; and
- The dissemination of three editions of the “Social Responsibility Report of Chinese International Contractors” in both Chinese and English, which have been well received by the public.

In the future, CHINCA will continue to actively promote the concept of sustainable infrastructure within the industry. It will continue to serve as a platform to strengthen partnership with institutions which promote sustainable infrastructure including the IDB, and to work on an industry-wide “Guide on Sustainable Infrastructure” which will set standards and codes for CHINCA’s member companies. The “Guide” will help CHINCA to conduct sustainability assessment and set exemplary models of infrastructure projects. CHINCA will also enhance cooperation with international financial institutions to seek their recognition of the new “Guide” and to achieve mutual benefit for such institutions and Chinese enterprises.

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