

2018 GIF ADVISORY COUNCIL MEETING

APRIL 18, 2018



AN INITIATIVE OF



WORLD BANK GROUP

AGENDA

GIF Advisory Council Meeting – April 18, 2018 IFC Auditorium

TIME	ACTIVITY	DESCRIPTION	SPEAKERS
8:00 - 8:30	BREAKFAST		
8:30 - 8:55	WELCOME & INTRODUCTORY REMARKS	Co-chairs will make introductory remarks and explain the agenda	Co-chairs: <ul style="list-style-type: none"> • Joaquim Levy, MD/CFO, World Bank Group • Macky Tall, Executive Vice President, Infrastructure, CDPQ and President and CEO, CDPQ Infra.
8:55 - 9:15	GIF Updates	A snapshot of GIF's operations and portfolio of investment opportunities and an update on the GIF midterm evaluation Q&A	Jordan Schwartz , Director, Infrastructure, PPPs & Guarantees, World Bank
9:15 - 9:35	Governance, Standards and the GIF	A summary on how the GIF plans to promote good governance and standards; introduce the latest <i>Procuring Infrastructure PPPs</i> report (2018) Q&A	Hart Schafer , Vice President, World Bank
9:35 - 11:00	Credit Data, EM Infra Index and Investment Decisions	Panelists will provide an update on various studies/initiatives on infrastructure investment and financing data as well as implications for regulators, investment decisions and financing options for banks and institutional investors Breakout session and Q&A	Moderator: Lakshmi Shyam-Sunder, Vice President and World Bank Group Chief Risk Officer Panelists: <ul style="list-style-type: none"> • Rui Croca, Operational Manager of the GEMS Risk Database & Senior Risk Officer, European Investment Bank • Todd Kowalski, Director of Business Development, Indexes, Morningstar • Andreas (Andy) Jobst, Adviser to MDCFO, World Bank Group

			<p>Discussants:</p> <ul style="list-style-type: none"> Emmanuelle Nasse Bridier, Group Chief Credit Officer, Group Investment & ALM, AXA Group Nasser Malik, Managing Director, Head of Global Structured Debt, Citigroup Thomas Bayerl, Head of Infrastructure Debt, Munich Re
11:00 - 11:15	COFFEE BREAK		
11:15 - 12:30	<p>Invest in Climate Smart Infrastructure</p>	<p>Panelists will discuss business opportunities and challenges for the private sector in the new climate economy, country experience and lessons, and roles of governments and MDBs</p> <p>Breakout session and Q&A</p>	<p>Moderator: John Roome, Senior Director, Climate Change, World Bank</p> <p>Panelists:</p> <ul style="list-style-type: none"> Alzbeta Klein, Director, International Finance Corporation Marcello Estevão, Secretary of International Affairs (Deputy Minister), Ministry of Finance, Brazil, and co-chair of the G20-Infrastructure Working Group Tobias Meier, Vice President, Swiss Re Thierry Deau, Founding Partner and CEO, Meridiam and Chairman of the Long-Term Infrastructure Investors Association (LTIIA) Vasuki Shastri, Global Head of Public Affairs and Sustainability, Standard Chartered Bank
12:30 - 12:45	WRAP UP AND CLOSING REMARKS	Co-chairs will make concluding remarks and discuss follow-up actions	Joaquim Levy and Macky Tall

**GIF Advisory Council Lunch
MC Building East Dining Room**

13:00 - 14:30	Lunch	<p>Remarks by Joaquim Levy to thank Macky Tall and introduce new co-chair, Rajeev Kannan, Head, Investment Banking, Asia, SMBC</p> <p>Lunch Speaker: Marcello Estevão, Secretary of International Affairs (Deputy Minister), Ministry of Finance, Brazil, and co-chair of the G20-Infrastructure Working Group</p>
---------------	--------------	--

**GIF Breakout Sessions
MC Building**

TIME	VENUE	ACTIVITY	DESCRIPTION	SPEAKERS
14:30 - 16:00	Room MC 7-100	Renewable Energy Programs: India, Egypt and the	Panelists will discuss country experience in renewable energy program design and	<p>Moderator:</p> <ul style="list-style-type: none"> Rohit Khanna, Practice Manager, World Bank

		Common Risk Mitigation Mechanism (CRMM)	preparation (solar); and the proposed global platform with standardized project preparation and risk instruments	<p>Presenters:</p> <ul style="list-style-type: none"> Manu Srivastava, Principal Secretary, New & Renewable Energy Department, Government of Madhya Pradesh, India Dalia Wahba, Country Manager, World Bank Kanika Chawla, Senior Programme Lead, Council on Energy, Environment and Water <p>Discussants:</p> <ul style="list-style-type: none"> Bhanu Mehrotra, Senior Investment Officer, International Finance Corporation Edith Quintrell, Underwriting Development Director – Global Financial Risks, Liberty Specialty Markets Ru Nyambuya, VP, Client Coverage, Corporate & Investment Banking, Standard Bank
14:30 - 16:00	Room MC 8-100	Deep Dive into the GIF Portfolio: Climate Smart projects under preparation	<p>The GIF Management Unit will discuss their project pipeline and highlight key features of select projects:</p> <ul style="list-style-type: none"> Colombia: Renewable Energy & Energy Efficiency Credit Enhancement Tunisia: Tunisia - Italy Interconnector (TII) Project Vietnam: Credit Rating Readiness and Preparation for Electricity of Vietnam (EVN) 	<p>Moderator:</p> <ul style="list-style-type: none"> Matthew Jordan-Tank, Head of Infrastructure Policy & Project Preparation, EBRD <p>Presenters:</p> <ul style="list-style-type: none"> GIF Management Unit <p>Discussants:</p> <ul style="list-style-type: none"> Duncan Caird, Managing Director, Head of Infrastructure & Real Estate Group - The Americas, Global Banking & Markets, HSBC Fuat Savas, Executive Director, Infrastructure Finance and Advisory, JP Morgan Luis Fernando Perdigon, Managing Director & Group Head, Project Finance, Latin America, SMBC

GIF Transaction Spotlight MC Building

TIME	VENUE	ACTIVITY	DESCRIPTION	SPEAKER
16:00 - 17:00	Room MC 8-100	Transaction Spotlight: Brazil Highways	A market-sounding session where IFC will present four GIF supported upcoming highway transactions (total investment of approx. US\$8bn). Transactions will be presented in the context of the recent, first true 'project	Bernardo Tavares de Almeida, Senior Investment Officer, International Finance Corporation



AN INITIATIVE OF



WORLD BANK GROUP



GIF 2018

ADVISORY COUNCIL MEETING

PANEL

Credit Data, EM Infra Index and Investment Decisions

Moderator: Lakshmi Shyam-Sunder, Vice President and WBG Chief Risk Officer, World Bank

APRIL 18, 2018

OVERVIEW

Global infrastructure financing demands are staggering - US\$90 trillion in infrastructure investment is needed globally by 2030 to achieve global growth expectations, particularly in developing countries.¹ Meeting these financing needs requires 'crowding in' private investment, as government budget envelopes alone will be unable.

Due to the nature of their investment demands, institutional investors² are increasingly regarded as a potential source of financing for infrastructure projects. They are well placed to invest in long term infrastructure assets, which match their investment time horizon. Further, they represent a large pool of capital. International Monetary Fund estimates suggest that institutional investors hold roughly \$100 trillion in assets under management.³ Yet, to date, this group of investors has failed to invest in any significant way in infrastructure—the World Bank found that institutional investors contributed only 0.67% of all private investment to EMDE infrastructure from 2011 to H1 2017.⁴

Taking full advantage of potential sources of private finance, like institutional investors, will require that such investors view infrastructure as an asset class; though achieving this is difficult. It will require:

1. Delivering bankable and investable projects
2. Providing more data on how such infrastructure investments perform
3. Creating more infrastructure investment standards

For private investors in infrastructure, all three of these requirements are important, yet lack of good risk and asset performance data has emerged as a key barrier to further investment in the asset class.⁵ Lack of data on the expected behavior of underlying infrastructure assets and portfolios has generated a knowledge deficit, preventing institutional investors from examining infrastructure investment options at the strategic asset allocation level and reinforcing perception among regulators that infrastructure investment is highly risky.⁶

Getting good data on infrastructure investments could therefore help potential infrastructure investors and interested stakeholders (e.g. prudential regulators and governments) better understand how such investments behave. In terms of driving more private investment into infrastructure, this could have implications for⁷:

- **Prudential regulators, who could provide a more nuanced regulation of infrastructure:** Regulators are interested in systemic risk (risk of collapse of the financial system). Thus, they require a clear understanding of the likelihood of very large losses for investors in privately-held infrastructure equity or debt.⁸ The intuition in the literature points towards the perception that currently, regulators see infrastructure as a riskier asset than it is; however, to date, there has been a paucity of data to back this up. Better understanding the risk profile and credit performance of infrastructure debt, for example, could lead to lower capital charges for infrastructure investments and a more nuanced regulation of these investments. This could help remove one barrier preventing institutional investors from investing in the asset type.

¹ NCE. 2015. Ensuring new infrastructure is climate-smart. Working paper. http://static.newclimateeconomy.report/wp-content/uploads/2014/08/NCE_SynthesisReport.pdf

² Sovereign wealth funds, mutual funds and other institutional investors

³ Arezki, Rabah et al. IMF Working Paper. From Global Savings Glut to Financing Infrastructure: The Advent of Investment Platforms. 2016. International Monetary Fund/

⁴ Saha, Deblina et al. "Contribution of Institutional Investors: Private Investment in Infrastructure 2011-H1 2017. World Bank. 2018 < http://ppi.worldbank.org/~media/GIAWB/PPI/Documents/Global-Notes/PPI_InstitutionalInvestors_Update_2017.pdf>

⁵ See: Lauridsen, Morten and Wang, Ben. Infrastructure & Public Private Partnerships Blog "The Art of Laying the Bricks" May 3, 2017

⁶ See: Blanc-Brude, Frederic. "Making a Better Match: Institutional Investors and Infrastructure" May 2014.

⁷ These three groups are taken from: Blanc-Brude et al. Data Collection for Infrastructure Investment Benchmarking: Objectives, Reality Check and Reporting Guidelines. June 2016. EDHEC Infrastructure Institute Singapore; however, better data could also help governments assess costs and benefits of infrastructure investments.

⁸ Blanc-Brude et al. Data Collection for Infrastructure Investment Benchmarking: Objectives, Reality Check and Reporting Guidelines. June 2016. EDHEC Infrastructure Institute Singapore.

- **Investors, who could understand whether to include infrastructure in asset allocation decisions:** Private sector investors in the infrastructure space do not have reliable risk data, making it hard for them to model-in asset allocations. Documenting the risk-adjusted performance of infrastructure investments compared to other public or private assets is necessary to making investing in infrastructure a relevant question at the strategic asset allocation level. This would enable the assessment of how an infrastructure investment contributes to overall investment objectives.
- **Investors, who could understand the “liability friendliness” infrastructure investments:** Many investors seek to invest in infrastructure “because of its expected ability to meet liability-hedging objectives.”⁹ Privately held infrastructure debt and equity generally has long tenors that are expected to provide stable cash flows, in part linked to domestic price-index.¹⁰ For these reasons, infrastructure investments could contribute to liability driven investment objectives.¹¹

⁹ ibid

¹⁰ Ibid

¹¹ ibid



Global Emerging Markets Risk Database

GEMS- Global Emerging Markets

18th April 2018

GEMs

Global Emerging Markets Risk Database

An overview

What is GEMs?



Global Emerging Markets Risk Database

The **Global Emerging Markets ('GEMs') Risk Database** is a comprehensive database of credit risk information combining almost 30 years of investment experience with sovereign, public and private counterparts across different loan types.

The data is collected anonymously between peer MDBs and DFIs to derive statistically significant Default Rates and Recovery Rates.

History

Established as a joint effort between the **European Investment Bank (EIB)** and the **International Finance Corporation (IFC)** of the **World Bank Group in 2009**.

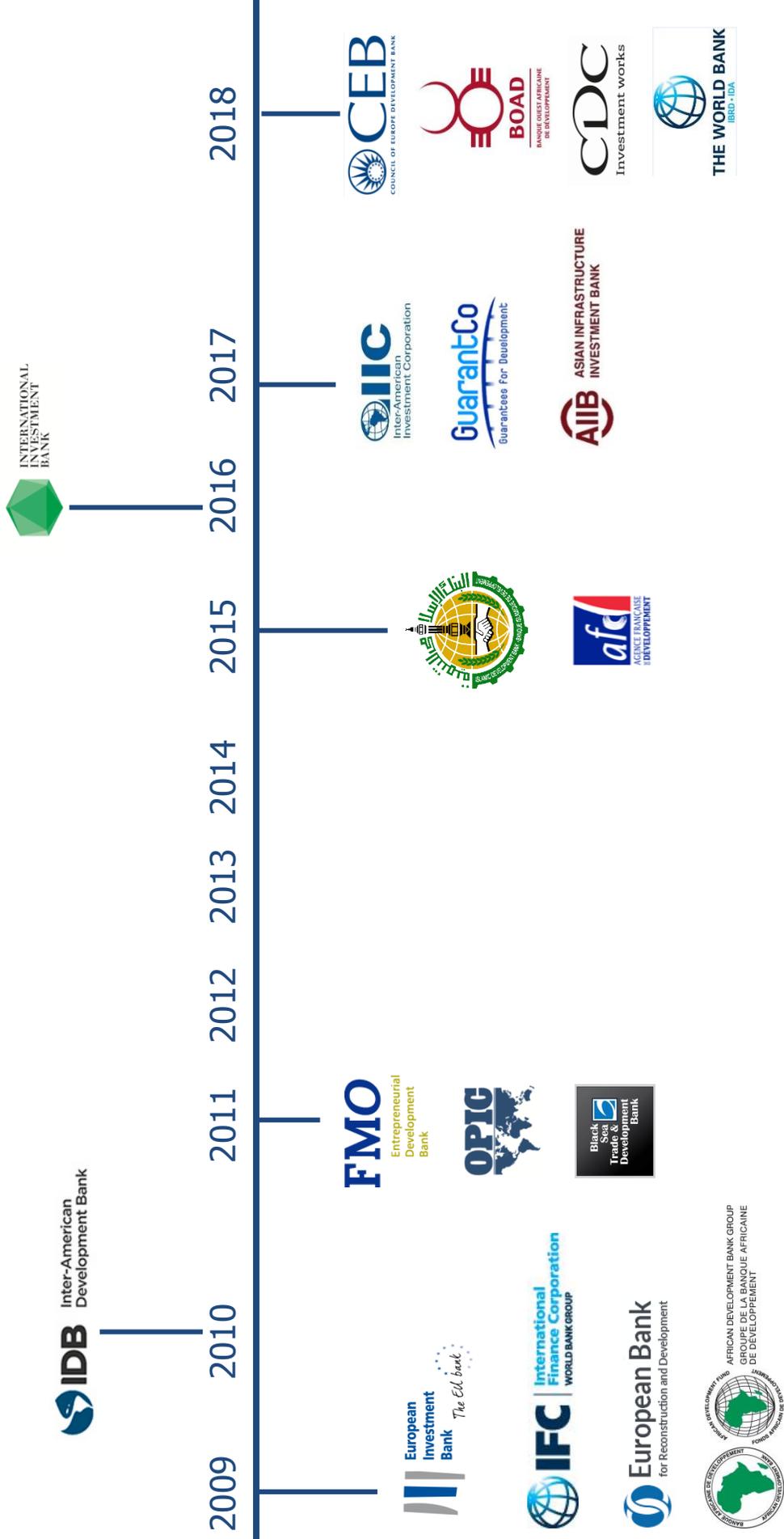
Membership has been steadily increasing and today the GEMs Consortium has **19 members**.

GEMs in Numbers

More than **8,000** sovereign, public and private counterparts on record in 2016.

1,690 observed counterpart defaults.
Recovery rates extracted from **1,928** resolved contracts.

19 GEMs Members





Global Emerging Markets Risk Database

The database

GEMS – Data Breakdown



Global Emerging Markets Risk Database

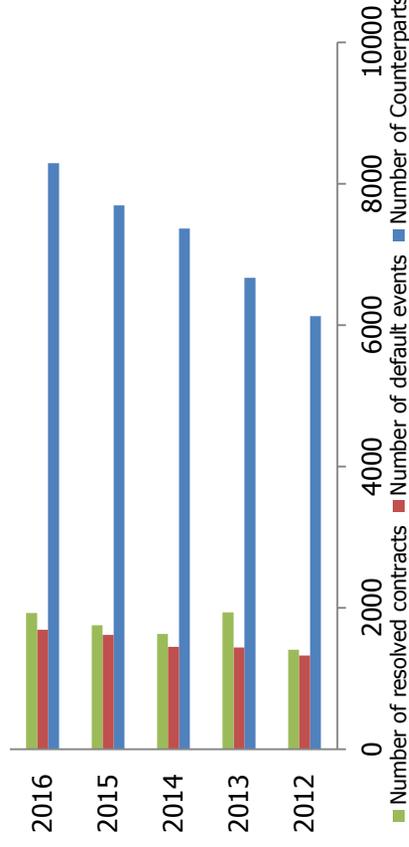
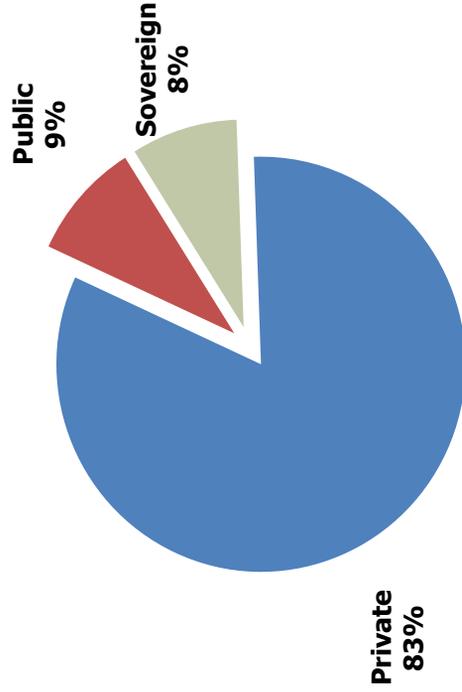
Database Composition

Observations	Total
Number of Active Counterparts	8,292
Number of Defaults	1,690
Contracts for Recovery Rates	1,928

Number of counterparts & defaults by category

Category	Number of Counterparts	Number of Defaults
Private	7,195	1,393
Public	803	155
Sovereign	294	142
Overall	8,292	1,690

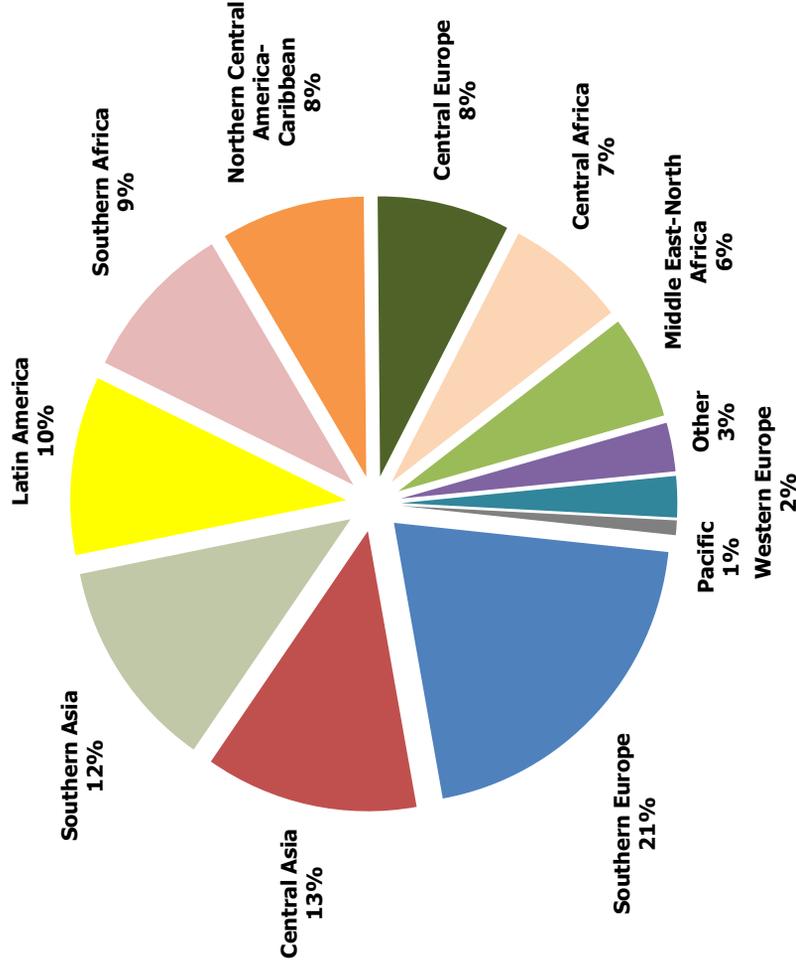
Breakdown of counterparts by category



29 year historical period from **1988 to 2015**
1,690 default events from a total number of **8,292** counterparts have been recorded
1,928 resolved contracts for recovery rate computation

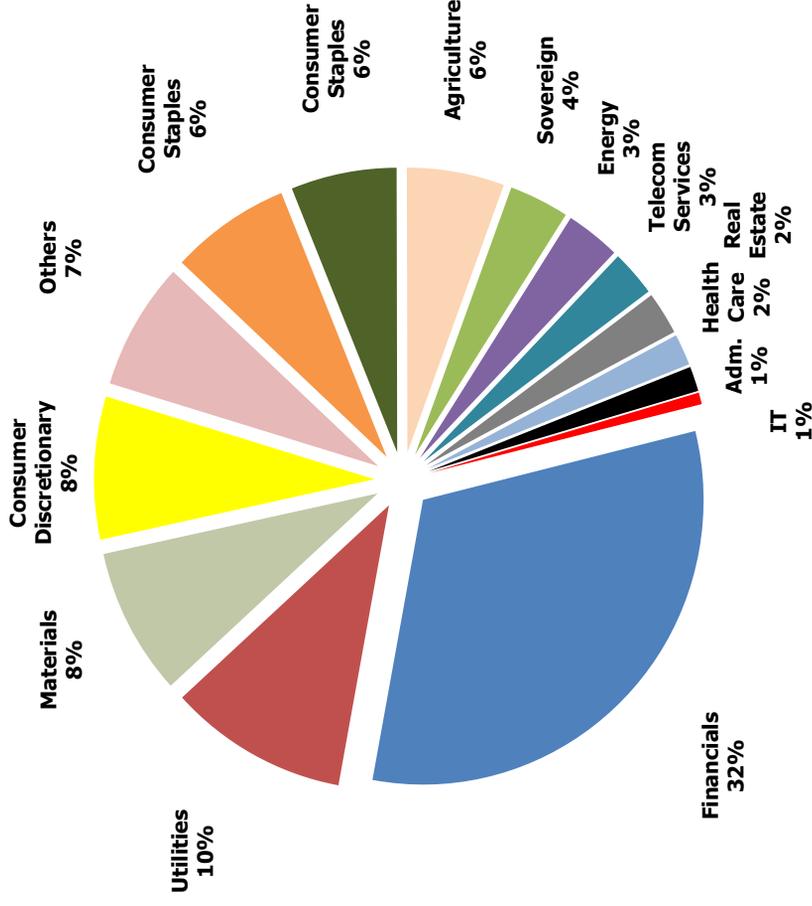
GEMs – Geographic Breakdown

Region	Number of Counterparts	Number of Defaults
Central Africa	583	266
Central Asia	1,033	125
Central Europe	643	36
Latin America	856	160
Middle East-North Africa	497	124
Northern Central America-Caribbean	698	123
Pacific	70	31
Southern Africa	768	324
Southern Asia	1,014	214
Southern Europe	1,700	215
Western Europe	197	26
Other	233	46
Overall	8,292	1,690



GEMs – Sectoral Breakdown

Sector	Number of Counterparts	Number of Defaults
Administration	117	11
Agriculture	465	152
Consumer	672	235
Discretionary	505	125
Consumer Staples	261	44
Energy	2,635	336
Financials	148	36
Health Care	573	114
Industrials	55	16
Information Technology	695	224
Materials	202	49
Real Estate	288	142
Sovereign	218	29
Telecommunication Services	856	120
Utilities	602	57
Overall	8,292	1,690



GEMS – PD Rating Scale

In order to combine data from different members, individual institutions map their internal ratings to a common rating scale following the **2013 Methodology Review**

This ensures that all members have the same understanding of ratings

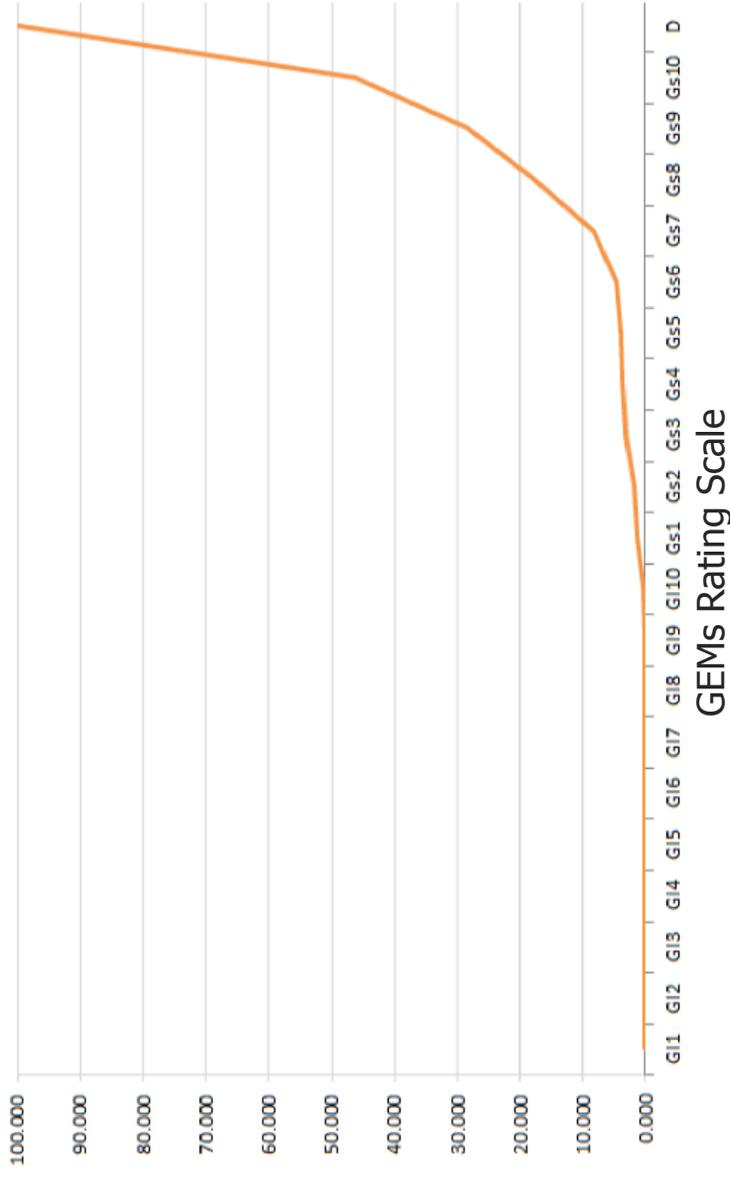
G11	0.000
G12	0.001
G13	0.001
G14	0.003
G15	0.006
G16	0.011
G17	0.039
G18	0.090
G19	0.170
G110	0.420
Gs1	1.277
Gs2	1.955
Gs3	3.164
Gs4	3.747
Gs5	3.984
Gs6	4.739
Gs7	8.278
Gs8	17.636
Gs9	28.396
Gs10	46.208
D	100.000

Moody's idealized rates

Gems empirical rates 2013

Moody's empirical rates (1998-2012)

Default Rates





Global Emerging Markets Risk Database

A blueprint for MDB collaboration

GEMs – Beyond a Database



Collaboration

- Share experience and expertise in Emerging Markets
- Benchmarking
- Relationship with Rating Agencies



Exchange

- New data for operations in Emerging Markets
- Help catalyse investment in Emerging Markets



Awareness

- Best Banking Practices
- Risk modelling
- Prudential rules

Fostering Investment in Emerging Markets

- UN 2030 Sustainable Development Goals (SDGs)
- Paris Agreement on climate change
- G20 Infrastructure Action Plan MDB Balance Sheet Optimisation
- “billions to trillions” agenda
- External Investment Plan

Mobilising private sector resources is key.

A Tool for Capital Mobilization

- **Financing the sustainable development goals (SDGs) is estimated to require an extra investment in infrastructure in emerging markets of over USD 1tr p.a. over the next 10 to 15 years.**
- **MDB's and IFI's have been a key contributor to investment but they can be expected to cover on their own probably no more than around 10% of these needs.**
- **Crowding-in private sector financing is critical to raise levels of development investment goals in the coming years as highlighted recently is several G20 initiatives.**

A Tool for Capital Mobilization

- **GEMs risk data covers a wide range of economic sectors, including a significant large number of infrastructure initiatives.**
- **The promotion of infrastructure as a global asset class is crucial for economic growth and development finance goals.**
- **To further enhance the catalytic role of MDBs in enabling private-sector infrastructure investment, one of the policy actions put forward is the suggestion that MDBs should share their comprehensive pooled data on credit performance.**
- **GEMs, as a dedicated risk database from the MDBs could form an important part of the way forward.**

Moving Towards GEMs 2.0



Global Emerging Markets Risk Database

- **Reliable risk information is often limited in emerging markets which contributes to a misperception of risk.**
- **GEMs represents an accumulated knowledge that could be widely shared, helping to attract private investors and to reposition MDBs as a primarily catalytic force in emerging markets.**
- **GEMs will be 'professionalised' via a new dedicated data-management solution.**
- **Following encouraging discussions held private sector players, the GEMs Consortium is working on opening its database to other institutional players and private sector investors.**

Morningstar Emerging Markets Bond Infrastructure Index

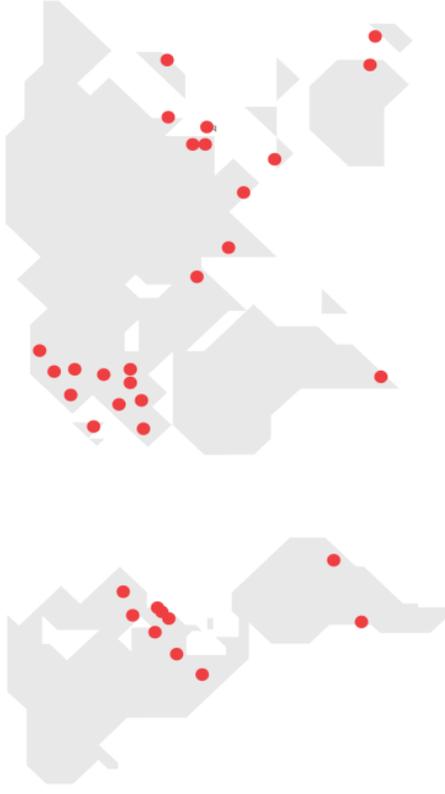


April 2018

Who We Are
Morningstar

Our mission is to create great products that help investors reach their financial goals.

We have 4,920+ employees in 27 countries worldwide, providing local market expertise.



Our clients range in size from individual investors all the way up to the world's top asset management firms.

Financial Advisors	Asset Managers	Retirement	Individual Investors
255,000 Independents & Affiliates	1,500+ Global Firms	285,000+ Plans	11.9 mil Website Users
\$39.8 bil Managed Portfolios	\$68.3 bil Investment Management	\$128.1 bil Retirement Solutions	

Global Regulators	Media Companies	Alliances & Redistributors
50+	95+	600+

Data as of December 31, 2017. Includes assets under management and advisement for Morningstar Investment Management LLC, Morningstar Investment Services LLC, Morningstar Investment Management Europe Ltd., Morningstar Investment Management Australia Ltd., Morningstar Investment Management South Africa (PTY) Ltd., and Ibbotson Associates Japan KK, all of which are subsidiaries of Morningstar, Inc. Advisory services listed are provided by one or more of these entities, which are authorized in the appropriate jurisdiction to provide such services.

Morningstar Indexes



Morningstar Research: 300+ Research Analysts



Morningstar Data: Global, Institutional quality data provider



Morningstar Expertise: 15+ Years



We offer **the most comprehensive range of market exposure indexes** across all major asset classes



Our **multi-asset class indexes** help investors meet specific goals and targeted outcomes



We draw upon our proprietary research to deliver **strategic beta indexes that harness market anomalies**



We help **align investments with investor desire** to transition to a sustainable global economy



Unique Indexes

600+

Investment Products
Linked to Our Indexes

64

AUM
Linked to Our Indexes

\$35B+

Data as of 31 December 2017

Morningstar Emerging Markets Bond Infrastructure Index Overview

- ▶ The **Morningstar Emerging Markets Bond Infrastructure Index** is designed to provide global, multicurrency, diversified exposure to corporate and quasi-sovereign debt issuers identified as infrastructure-related companies and security issuers domiciled in Emerging Market countries.
 - ▷ Inception Date: January 2, 2018
 - ▷ Performance Inception Date: December 31, 2003
 - ▷ Index Family: Morningstar Global Bond Infrastructure Indexes
- ▶ Dissemination of Index Values
 - ▷ Morningstar Website: [Morningstar Indexes | Fixed Income](#)
 - ▷ Bloomberg:
 - ▷ **MSBIEMIG** | Total Return (GR) USD Unhedged
 - ▷ **MSBIEMIP** | Price Return USD Unhedged
 - ▷ **MSBIEMIH** | Total Return (GR) USD Hedged

Morningstar Emerging Markets Bond Infrastructure Index **Recognizing a Need in the Marketplace**

- ▶ Fixed income is a large portion of the capital structure of infrastructure investments, but most existing managed infrastructure listed products are equity based.
- ▶ The Morningstar Emerging Markets Infrastructure Index fills this gap.
- ▶ Fixed income provides deeper exposure to the infrastructure market; private companies, special purpose investment vehicles and public-private partnerships issue liquid, tradeable corporate bonds.
- ▶ Infrastructure debt is typically characterized by high credit quality, low default rates, and high recovery rates — favorable attributes from a managed products perspective.
- ▶ This index is limited to corporate issues which enables the sourcing of reliable and consistent pricing, a key attribute from an index creation perspective.

Morningstar Emerging Markets Bond Infrastructure Index

Providing Decision Making Insight

- ▶ Measurement
 - ▶ Transparent and precise data
 - ▶ Investment performance
 - ▶ Portfolio attributes
 - ▶ Comparative performance across asset classes or cohorts
 - ▶ Changes in index composition
- ▶ Planning
 - ▶ Growth
 - ▶ Resource allocation
 - ▶ Capital commitments

Morningstar Emerging Markets Bond Infrastructure Index

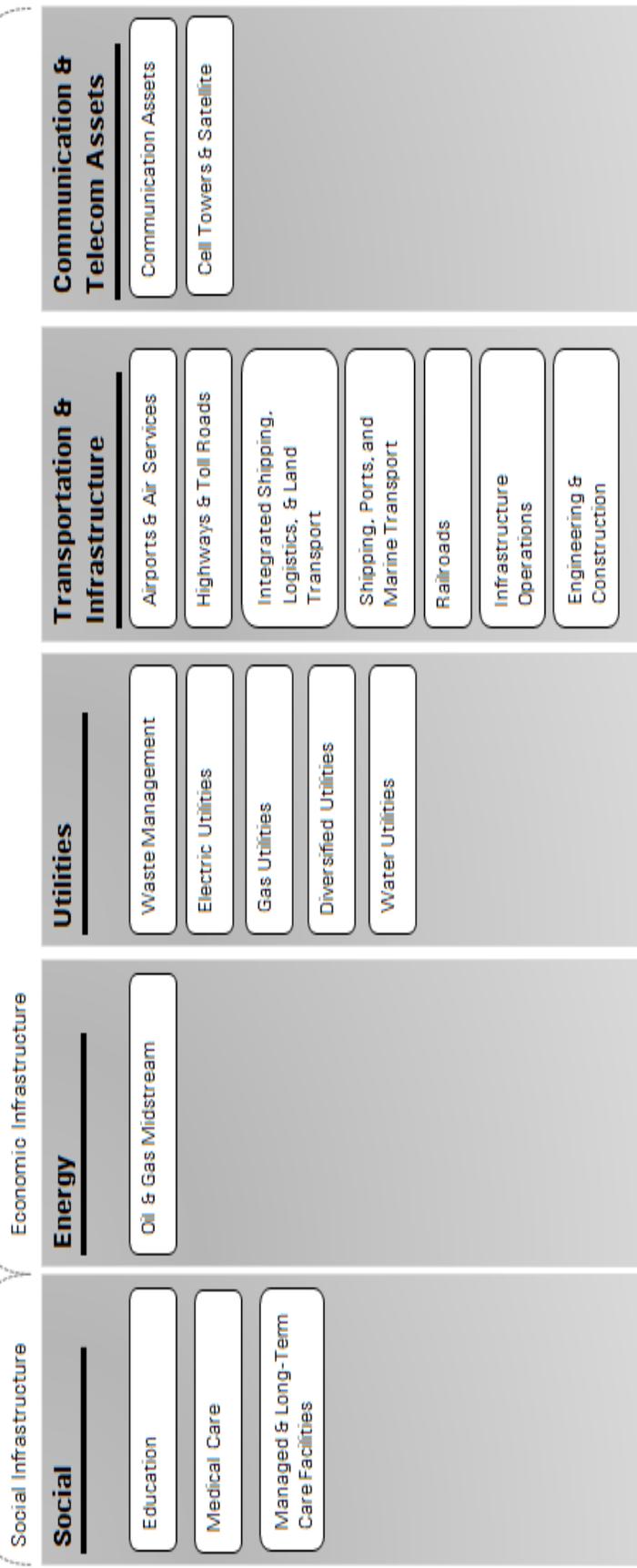
Defining Infrastructure

The Morningstar infrastructure taxonomy consists of 18 industries that meet Morningstar's definition of the infrastructure asset class. Industries fall into one of the five segments organized into two super sectors.

Morningstar Global Infrastructure Taxonomy

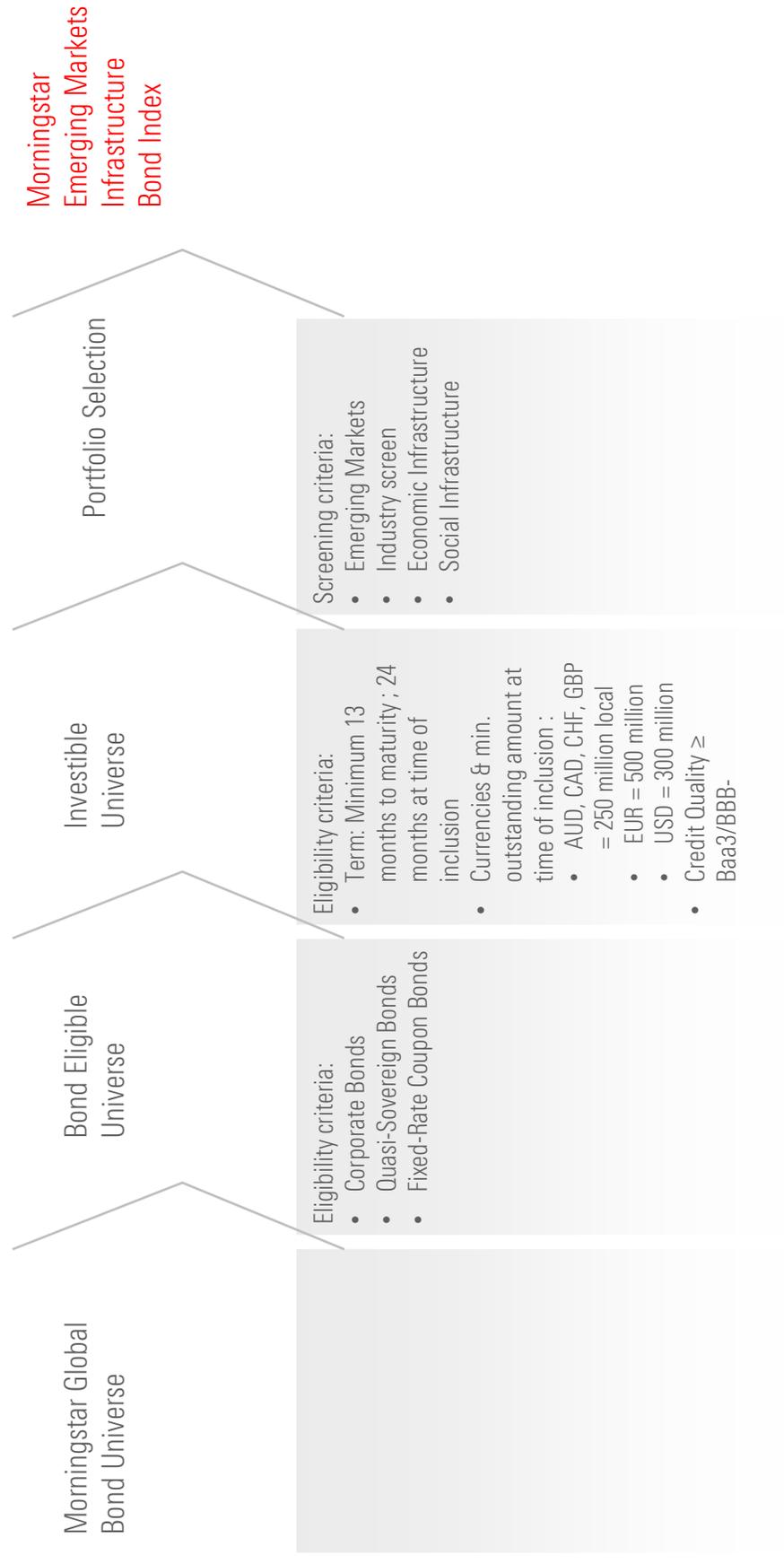


Global Infrastructure



Morningstar Emerging Markets Bond Infrastructure Index Index Construction Process

Starting with a global bond universe, Morningstar implements screening parameters to identify an optimal EM Infrastructure Bond portfolio



Morningstar Indexes Portfolio Characteristics

For equal credit quality, Emerging Markets Infrastructure provides a yield pickup of 1.1% and a duration that is 1.7 years shorter than Global Infrastructure, suggesting that investors evaluate it through a high yield lens.

	Morningstar Emerging Markets Infrastructure Bond Index	Morningstar Global Infrastructure Bond Index	Morningstar Emerging Markets Corporate Bond Index
Market Value (\$Billions)	114.3	893.4	849.8
Credit Quality	A-/BBB+	A-/BBB+	BBB
Modified Duration / Term	6.5 / 10.0	8.2 / 12.2	5.2 / 7.6
Coupon / YTM	4.6% / 3.72%	4.1% / 2.64%	5.2 / 4.34
Constituent Securities	160	1261	897
Bond Issuers	78	292	170

Morningstar Indexes

Morningstar Infrastructure and EM Bond Index Performance Comparisons

A 10-year return pickup of 1.1% annualized compared to Global Infrastructure, achieved with lower risk; closer in return to Morningstar's Emerging Markets Corporate Index but with a significantly lower maximum drawdown.

Total Returns USD 10-Years Ended December 2017

Bond Index Name	Return	Std Dev	Sharp Ratio	Max Drawdown
Emerging Markets Infrastructure*	6.17	7.37	0.81	(21.07)
Global Infrastructure*	5.04	7.58	0.65	(17.27)
Emerging Markets Corporate***	6.76	12.26	0.58	(35.21)
Emerging Markets High Yield & Sovereign**	8.10	11.31	0.72	(27.75)

* Investment Grade

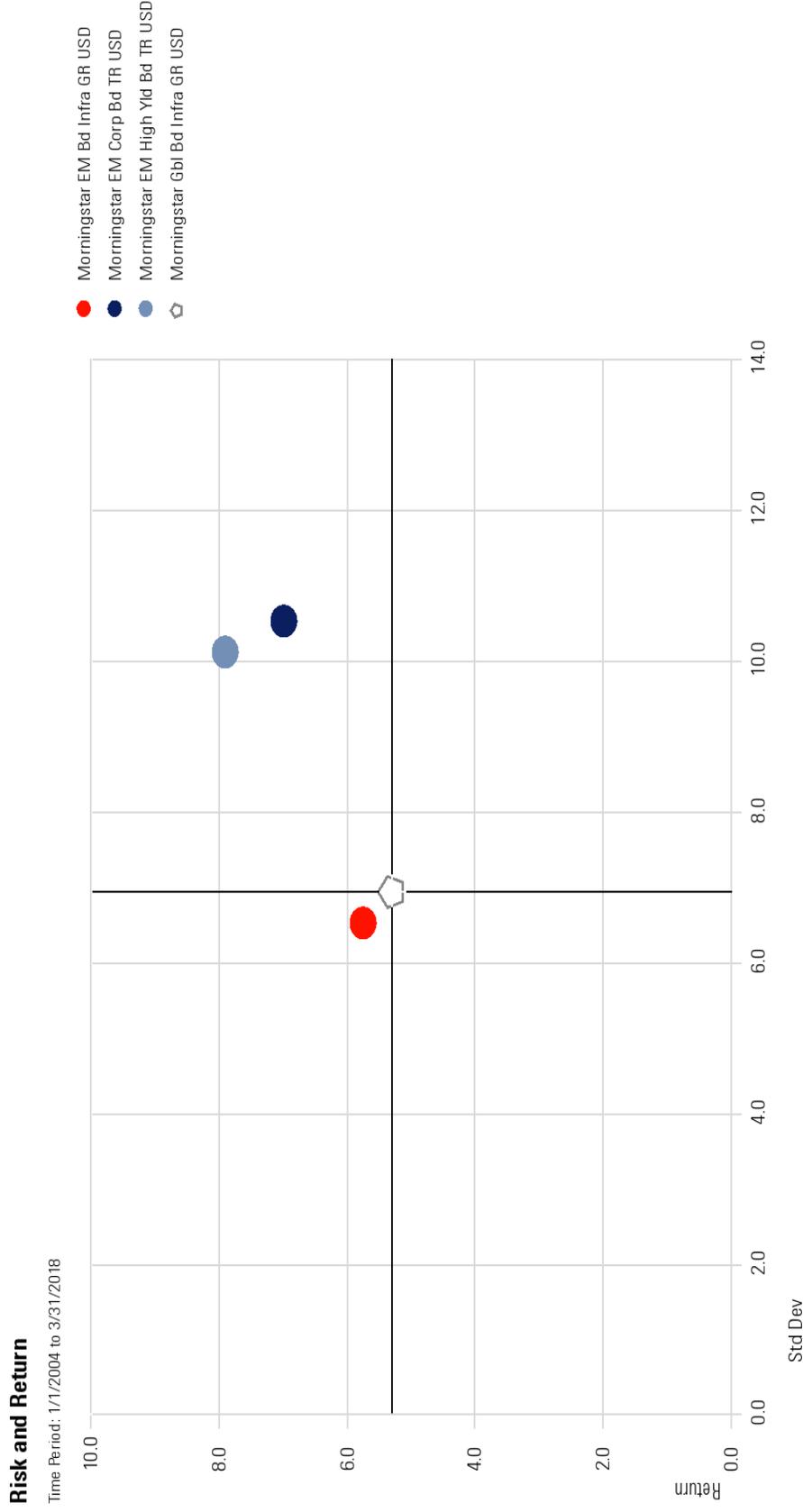
** High Yield

*** Both IG & HY

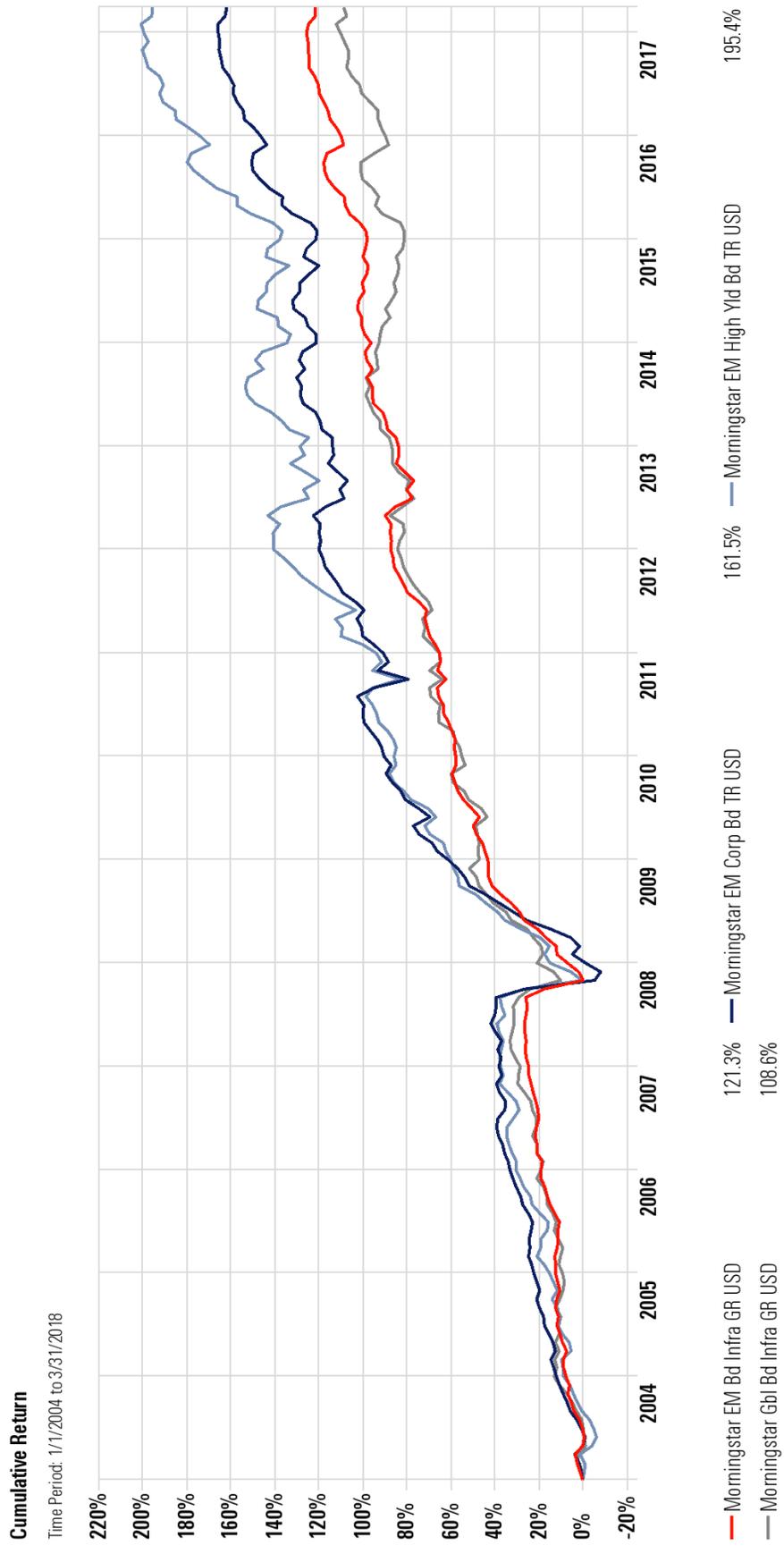
Morningstar Indexes

Favorable Risk Return Characteristics

Lower standard deviation and higher return over long-term investment horizons



Morningstar Emerging Markets Bond Infrastructure Index Cumulative and Trailing Returns



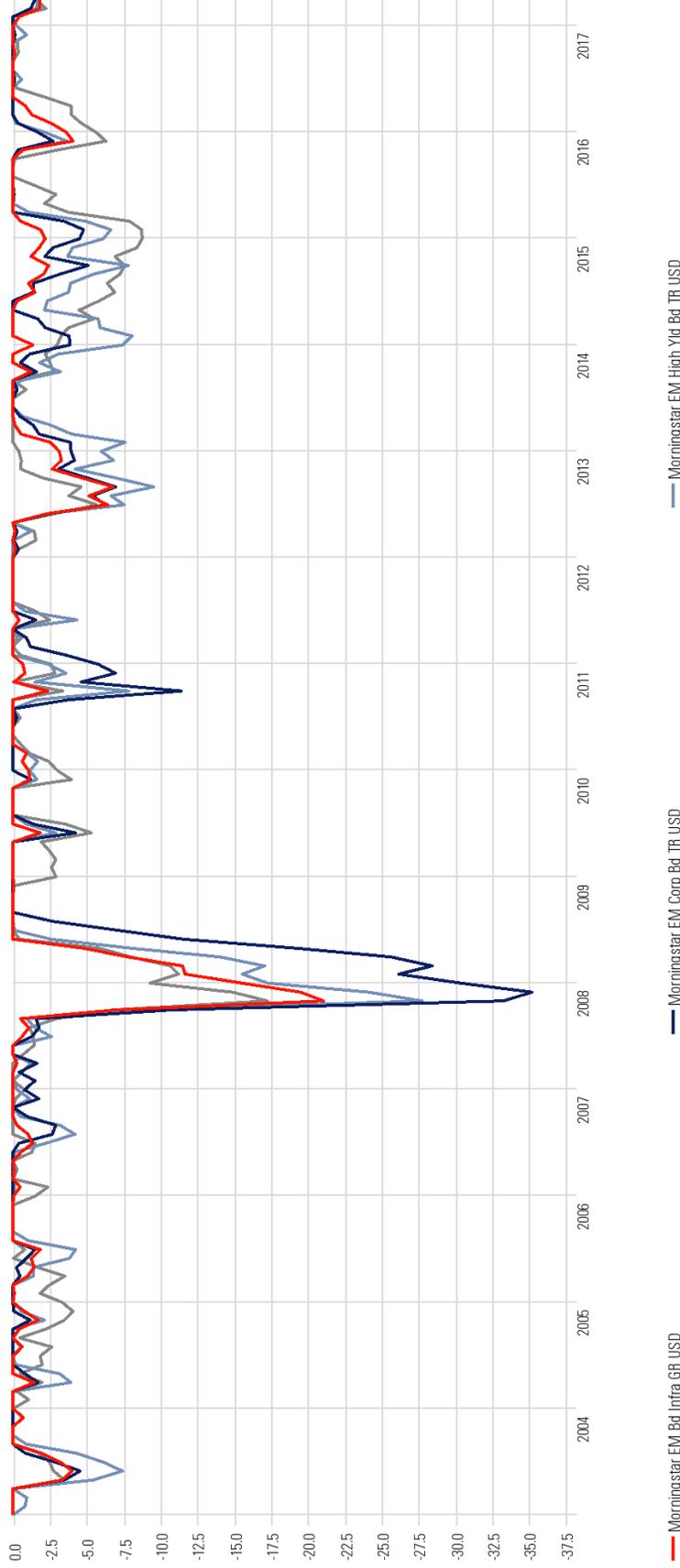
Trailing Annualized Total Return

	1 Year	2 Years	3 Years	1/1/2004 - 3/31/2018
Morningstar EM Bd Infra GR USD	2.61%	3.66%	3.38%	5.73%
Morningstar EM Corp Bd TR USD	2.95%	6.24%	5.00%	6.98%
Morningstar EM High Yld Bd TR USD	3.64%	8.61%	7.39%	7.90%
Morningstar Gbl Bd Infra GR USD	8.11%	4.50%	3.61%	5.29%

Morningstar Emerging Markets Bond Infrastructure Index Drawdown and Risk Statistics

Drawdown

Time Period: 1/1/2004 to 3/31/2018



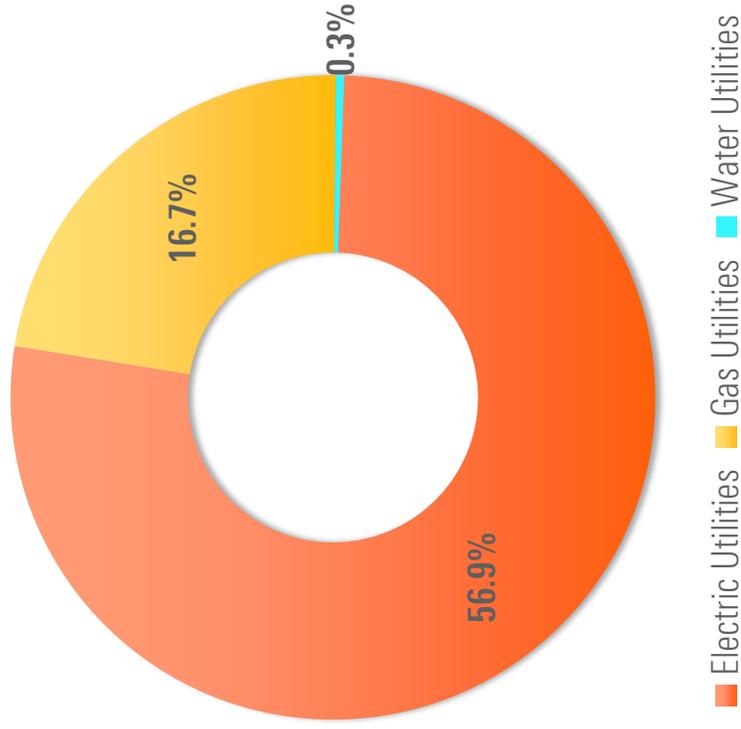
Risk Statistics

	Std Dev	Beta	Alpha	Tracking Error	Sharpe Ratio	Information Ratio
Morningstar EM Bd Infra GR USD	6.55	0.75	1.78	4.39	0.70	0.09
Morningstar EM Corp Bd TR USD	10.53	1.11	1.40	7.25	0.58	0.22
Morningstar EM High Yld Bd TR USD	10.13	1.14	2.03	6.44	0.68	0.38
Morningstar Gbl Bd Infra GR USD	6.95	1.00	0.00	0.00	0.60	

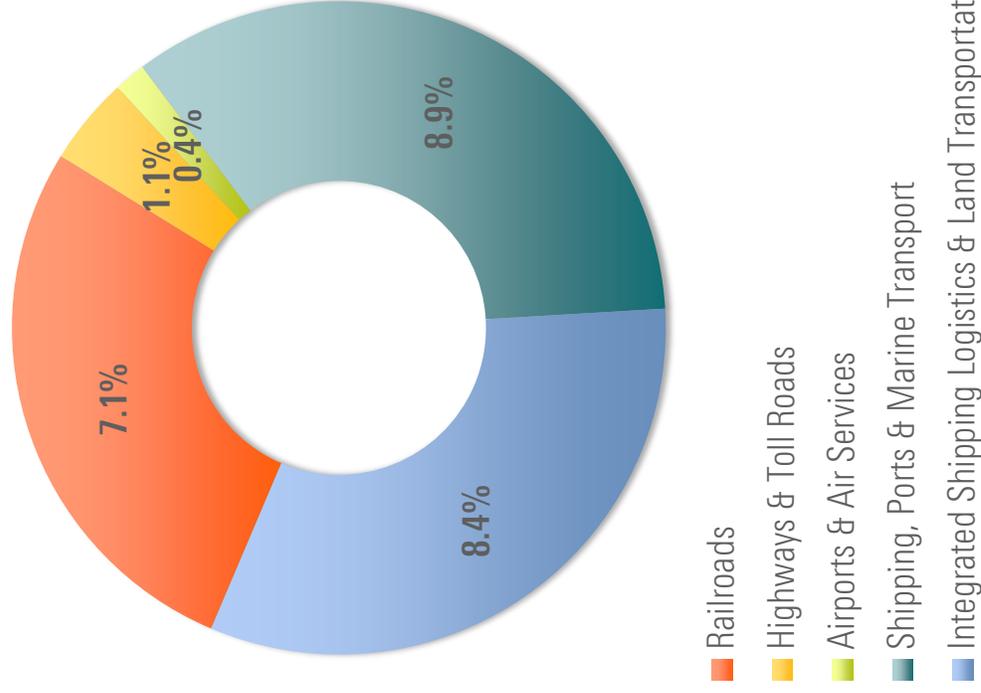
Morningstar Emerging Markets Bond Infrastructure Index

Sector Exposure

Utilities (73.96%)



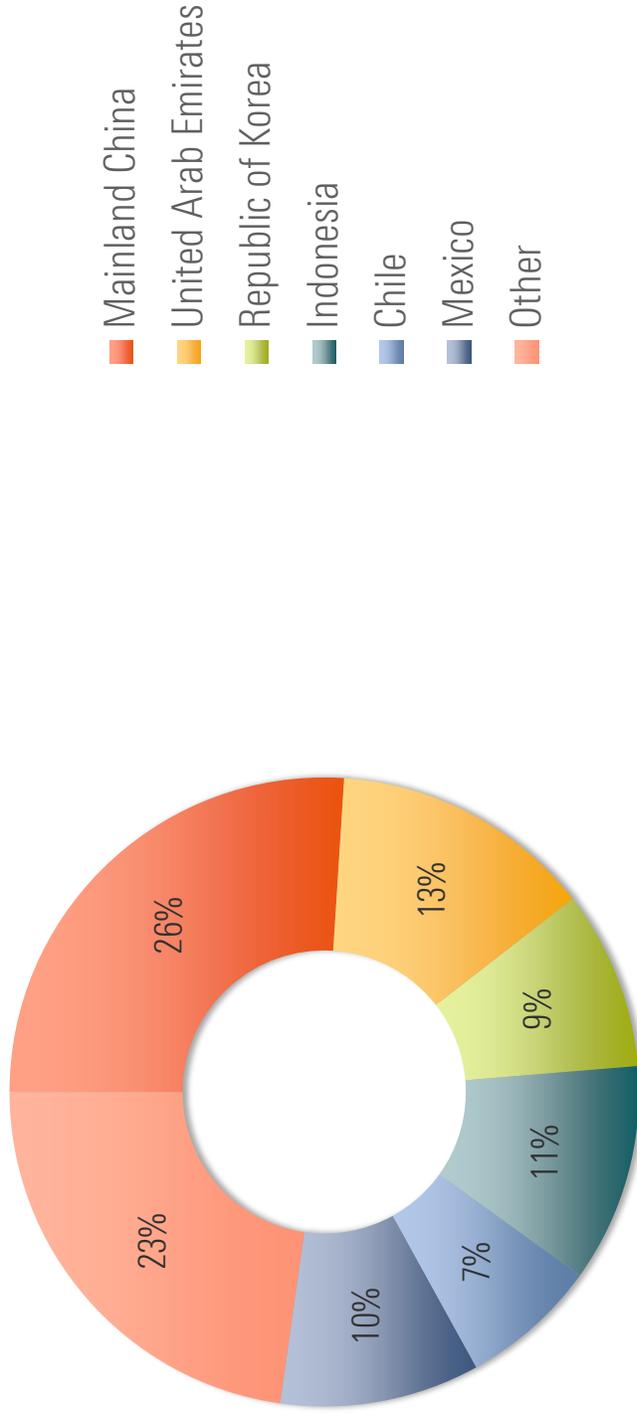
Transportation & Infrastructure (26.04%)



Data as of December 29, 2017
 industry composition is expressed as a percentage of total market value in base currency

Morningstar Emerging Markets Bond Infrastructure Index

Country Exposure



Data as of December 29, 2017
Country composition is expressed as a percentage of total market value in base currency

Morningstar Indexes

Future Infrastructure Index Developments

- ▶ Sustainability has become a critical factor in the development of infrastructure.
- ▶ Morningstar is beginning to tap the depth and breadth of potential opportunities to measure how sustainable development principals can be applied to international finance.
- ▶ Infrastructure and environmental finance suffer from a paucity of hard numbers related to both liquid and illiquid investments.
- ▶ Aside from investible indexes, benchmarking the flow of funds tied to sustainable infrastructure projects is necessary for good stewardship and for the allocation of scarce resources.
- ▶ Morningstar has the most comprehensive multi-currency bond infrastructure index available...
...And a commitment to providing sustainability research to investors.

Morningstar Indexes Index Information

- ▶ Contact: [Morningstar Indexes Team](#)
- ▶ Learn More: [Connecting the science and art of indexing | Morningstar U.S.](#)
- ▶ Index Methodology: [Thematic Indexes](#)
- ▶ Index Values: [Morningstar Indexes | Fixed Income](#)
- ▶ Sustainable Investing: [Sustainability Ratings](#)
- ▶ Bloomberg Tickers: Morningstar Emerging Markets Bond Infrastructure Index
 - ▶ [MSBIEMIG](#) | Total Return (GR) USD Unhedged
 - ▶ [MSBIEMIH](#) | Total Return (GR) USD Hedged
 - ▶ [MSBIEMIP](#) | Price Return USD Unhedged

Morningstar Indexes

About Morningstar, Inc.

Morningstar, Inc. is a leading provider of independent investment research in North America, Europe, Australia, and Asia. Morningstar offers an extensive line of products and services for individual investors, financial advisors, asset managers, and retirement plan providers and sponsors. Morningstar provides data on approximately 510,000 investment offerings, including stocks, mutual funds, and similar vehicles, along with real-time global market data on more than 17 million equities, indexes, futures, options, commodities, and precious metals, in addition to foreign exchange and Treasury markets. Morningstar also offers investment management services through its investment advisory subsidiaries.

About Morningstar Indexes

Morningstar® Indexes combine the science and art of indexing to give investors a clearer view into the world's financial markets. Our indexes are based on transparent, rules-based methodologies that are thoroughly back-tested and supported by original research. Covering all major asset classes, our indexes originate from the Morningstar Investment Research Ecosystem—our network of accomplished analysts and researchers working to interpret and improve the investment landscape. Clients such as exchange-traded fund providers and other asset management firms work with our team of experts to create distinct, investor-focused products based on our indexes. Morningstar Indexes also serve as a precise benchmarking resource.

For More Information

Reach out to us via our [communication page](#).

Credit Dynamics of Infrastructure Investment— Considerations for Financial Regulators

Global Infrastructure Facility

Advisory Council Meeting

Session on “Credit Data, EM Infrastructure Index, and Investment Decisions”
(9.35am-11.00am)

Andreas (Andy) Jobst

Office of the Managing Director and CFO
World Bank Group

April 18, 2018

Regulatory Treatment of Infrastructure Investment for Insurance Companies

- **Enabling regulatory environment fundamental to mobilizing long-term finance**
 - Infrastructure is natural match for life insurers' liabilities-driven investment strategies → predictable and stable cash flows over the long term, with low correlation to other assets
- **Most insurance regulations do not treat infrastructure finance as distinct asset class**
 - High capital charges for long-term debt investments, esp. for unrated transactions
 - But anecdotal evidence suggests lower expected losses than those of corporate exposures
- **EIOPA (2015) acknowledged favorable credit risk profile of infrastructure finance**
 - Amendment of Solvency II for “qualifying infrastructure” in EU Regulation 2016/467 (April 1, 2016), which was refined in EU Regulation 2017/1542 (Sept. 14, 2017)
- **In most countries, data constraints have limited scope of possible differentiation, esp. for exposures in EMDEs → Moody's published new study with focus on EMDEs**

GIF Advisory Council: Credit Performance of PF Bank Loans in EMDs

Andrew Davison, SVP, Infrastructure Finance Group

18 April, 2018

Moody's Project Finance Bank Loan Data Set

December 2017: Resilient performance in emerging markets

INFRASTRUCTURE AND PROJECT FINANCE

MOODY'S
INVESTORS SERVICE

SECTOR IN-DEPTH
13 December 2017

Reps this Research >>

TABLE OF CONTENTS

Scope	2
Distribution of projects and defaults	2
Recovery rates analysis	38
Appendix A: Country	45
Appendix B: Comparison of data	47
Appendix C: Stability of default & recovery rates	48
Appendix D: Time horizon 1995-2015	49
Moody's related publications	52
Noticias en Data Consortium	53

Analyst Contacts

Andrew Davison	+44 20 7772 5532
Andrew Davison	andrew.davison@moody.com
Kathryn Holman	+1 212 553 4684
VP - Senior Analyst	
kat.holman@moody.com	
Michael McInerney	+1 212 553 3665
M&I Project Finance	
Michael McInerney	michael.mcinerney@moody.com
Walter Williams	+1 212 553 3943
M&I C&I Proj and Infra	
Walter Williams	walter.williams@moody.com

CLIENT SERVICES

Americas	1-212-553-1653
Asia Pacific	852-3531-3077
Japan	81-3-5408-4100
EMEA	44-20-7772-5454

Default research - Global

Default and recovery rates for project finance bank loans, 1983-2015: Resilient performance in emerging markets

This addendum to our March 2017 study compares the credit performance of certain subsets of projects located in advanced economies with certain subsets of projects located in emerging market and developing economies (EMDEs). These subsets correspond to different definitions of advanced economies and EMDEs. Our analysis considers the credit performance of these subsets by industry sector, for Public-Private Partnership (PPP) and non-PPP projects, by country income level, and over the 1995-2015 time horizon in addition to the 1983-2015 study period. Our key findings are as follows:

- ▶ **The credit performance of project finance bank loans in EMDEs has been resilient.** 10-year cumulative default rates for EMDE subsets are broadly consistent with 10-year cumulative default rates for Ba1-rated corporates (10.5%). Ultimate recovery rates for defaults within our EMDE subsets are high, averaging approximately 80%.
- ▶ **There are variations in credit performance across principal industry sectors.** For the infrastructure industry sector, the 10-year cumulative default rate is higher in EMDEs and average recoveries are slightly lower than for advanced economies where projects are concentrated. For the oil and gas industry sector, the 10-year cumulative default rate is slightly higher in EMDEs and average recoveries are slightly lower than for advanced economies. For the oil and gas industry sector, 10-year cumulative default rates are similar between EMDEs and advanced economies, while the average recovery rate in EMDEs is notably higher.
- ▶ **Curtailed time horizon for our analysis to 1995-2015 from 1983-2015 shows lower default rates for all advanced economy and EMDE subsets, but has limited impact on recovery rates.** The differences in default rates between the advanced economy and EMDE subsets are also lower for the 1995-2015 time horizon. Recovery rates for the advanced economy subsets are approximately 80% and are between 57.7% for the EMDE subsets.
- ▶ **In EMDEs, 40-50% of defaults are due to country risk. In advanced economies, 50-60% of defaults are caused by market risk.**

▶ Incremental research published in December 2017

– Compares credit performance of projects in advanced economies with projects in emerging market and developing economies (EMDEs)

▶ Key findings include:

– Resilient credit performance of project finance bank loans in EMDEs:

- ▶ 10-year cumulative default rates (CDRs) between 9.4-10.3%
- ▶ 10-year CDRs consistent with Ba1-rated corporates (10.5%)
- ▶ High ultimate recovery rates averaging approximately 80%

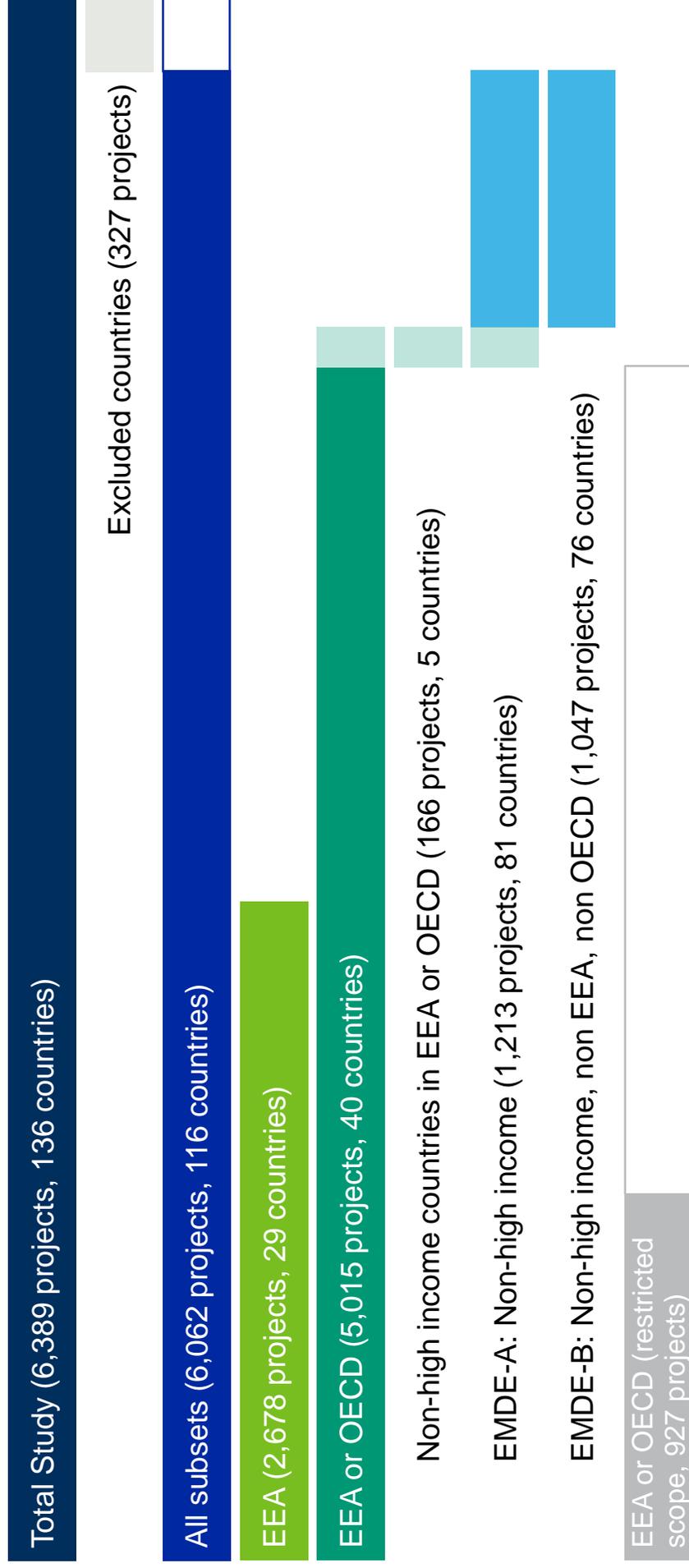
– Variations in credit performance across principal industry sectors

– Curtailed time horizon 1995-2015 shows lower 10-year CDRs, but limited impact on recovery rates

– In EMDEs, 40-50% of defaults are due to country risk

– In advanced economies, 50-60% of defaults are caused by market risk

Overview of Data Subsets



Notes:

- (1) EEA refers to European Economic Area
- (2) Non-high income countries in the EEA or OECD (i.e. Bulgaria, Croatia, Mexico, Romania and Turkey) are excluded from the EMDE-B subset
- (3) The EEA or OECD (restricted scope) subset comprises infrastructure projects in the EEA or OECD regions with availability-based revenues

MOODY'S
INVESTORS SERVICE

Andrew Davison
Email: andrew.davison@moody's.com
Phone: +44 20 7772 5552

moody's.com

© 2018 Moody's Corporation, Moody's Investors Service, Inc., Moody's Analytics, Inc. and/or their licensors and affiliates (collectively, "MOODY'S"). All rights reserved.

CREDIT RATINGS ISSUED BY MOODY'S INVESTORS SERVICE, INC. AND ITS RATINGS AFFILIATES ("MIS") ARE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES, AND MOODY'S PUBLICATIONS MAY INCLUDE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES. MOODY'S DEFINES CREDIT RISK AS THE RISK THAT AN ENTITY MAY NOT MEET ITS CONTRACTUAL, FINANCIAL OBLIGATIONS AS THEY COME DUE AND ANY ESTIMATED FINANCIAL LOSS IN THE EVENT OF DEFAULT. CREDIT RATINGS DO NOT ADDRESS ANY OTHER RISK, INCLUDING BUT NOT LIMITED TO: LIQUIDITY RISK, MARKET VALUE RISK, OR PRICE VOLATILITY. CREDIT RATINGS AND MOODY'S OPINIONS INCLUDED IN MOODY'S PUBLICATIONS ARE NOT STATEMENTS OF CURRENT OR HISTORICAL FACT. MOODY'S PUBLICATIONS MAY ALSO INCLUDE QUANTITATIVE MODEL-BASED ESTIMATES OF CREDIT RISK AND RELATED OPINIONS OR COMMENTARY PUBLISHED BY MOODY'S ANALYTICS, INC. CREDIT RATINGS AND MOODY'S PUBLICATIONS DO NOT CONSTITUTE OR PROVIDE INVESTMENT OR FINANCIAL ADVICE, AND CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT AND DO NOT PROVIDE RECOMMENDATIONS TO PURCHASE, SELL, OR HOLD PARTICULAR SECURITIES. NEITHER CREDIT RATINGS NOR MOODY'S PUBLICATIONS COMMENT ON THE SUITABILITY OF AN INVESTMENT FOR ANY PARTICULAR INVESTOR. MOODY'S ISSUES ITS CREDIT RATINGS AND PUBLISHES MOODY'S PUBLICATIONS WITH THE EXPECTATION AND UNDERSTANDING THAT EACH INVESTOR WILL, WITH DUE CARE, MAKE ITS OWN STUDY AND EVALUATION OF EACH SECURITY THAT IS UNDER CONSIDERATION FOR PURCHASE, HOLDING, OR SALE.

MOODY'S CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT INTENDED FOR USE BY RETAIL INVESTORS AND IT WOULD BE RECKLESS AND INAPPROPRIATE FOR RETAIL INVESTORS TO USE MOODY'S CREDIT RATINGS OR MOODY'S PUBLICATIONS WHEN MAKING AN INVESTMENT DECISION. IF IN DOUBT YOU SHOULD CONTACT YOUR FINANCIAL OR OTHER PROFESSIONAL ADVISER.

ALL INFORMATION CONTAINED HEREIN IS PROTECTED BY LAW, INCLUDING BUT NOT LIMITED TO, COPYRIGHT LAW, AND NONE OF SUCH INFORMATION MAY BE COPIED OR OTHERWISE REPRODUCED, REPACKAGED, FURTHER TRANSMITTED, TRANSFERRED, DISSEMINATED, REDISTRIBUTED OR RESOLD, OR STORED FOR SUBSEQUENT USE FOR ANY SUCH PURPOSE, IN WHOLE OR IN PART, IN ANY FORM OR MANNER OR BY ANY MEANS WHATSOEVER, BY ANY PERSON WITHOUT MOODY'S PRIOR WRITTEN CONSENT.

CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT INTENDED FOR USE BY ANY PERSON AS A BENCHMARK AS THAT TERM IS DEFINED FOR REGULATORY PURPOSES AND MUST NOT BE USED IN ANY WAY THAT COULD RESULT IN THEM BEING CONSIDERED A BENCHMARK.

All information contained herein is obtained by MOODY'S from sources believed by it to be accurate and reliable. Because of the possibility of human or mechanical error as well as other factors, however, all information contained herein is provided "AS IS" without warranty of any kind. MOODY'S adopts all necessary measures so that the information it uses in assigning a credit rating is of sufficient quality and from sources MOODY'S considers to be reliable including, when appropriate, independent third-party sources. However, MOODY'S is not an auditor and cannot in every instance independently verify or validate information received in the rating process or in preparing the Moody's publications.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability to any person or entity for any indirect, special, consequential, or incidental losses or damages whatsoever arising from or in connection with the information contained herein or the use of or inability to use any such information, even if MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers is advised in advance of the possibility of such losses or damages, including but not limited to: (a) any loss of present or prospective profits or (b) any loss or damage arising where the relevant financial instrument is not the subject of a particular credit rating assigned by MOODY'S.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability for any direct or compensatory losses or damages caused to any person or entity, including but not limited to by any negligence (but excluding fraud, willful misconduct or any other type of liability that, for the avoidance of doubt, by law cannot be excluded) on the part of, or any contingency within or beyond

the control of, MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers, arising from or in connection with the information contained herein or the use of or inability to use any such information.

NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE ACCURACY, TIMELINESS, COMPLETENESS, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OF ANY SUCH RATING OR OTHER OPINION OR INFORMATION IS GIVEN OR MADE BY MOODY'S IN ANY FORM OR MANNER WHATSOEVER.

Moody's Investors Service, Inc., a wholly-owned credit rating agency subsidiary of Moody's Corporation ("MCO"), hereby discloses that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by Moody's Investors Service, Inc. have, prior to assignment of any rating, agreed to pay to Moody's Investors Service, Inc. for appraisal and rating services rendered by it fees ranging from \$1,500 to approximately \$2,500,000. MCO and MIS also maintain policies and procedures to address the independence of MIS's ratings and rating processes. Information regarding certain affiliations that may exist between directors of MCO and rated entities, and between entities who hold ratings from MIS and have also publicly reported to the SEC an ownership interest in MCO of more than 5%, is posted annually at www.moody's.com under the heading "Investor Relations — Corporate Governance — Director and Shareholder Affiliation Policy."

Additional terms for Australia only: Any publication into Australia of this document is pursuant to the Australian Financial Services License of MOODY'S affiliate, Moody's Investors Service Pty Limited ABN 61 003 399 657AFSL, 336969 and/or Moody's Analytics Australia Pty Ltd ABN 94 105 136 972 AFSL 383569 (as applicable). This document is intended to be provided only to "wholesale clients" within the meaning of section 761G of the Corporations Act 2001. By continuing to access this document from within Australia, you represent to MOODY'S that you are, or are accessing the document as a representative of, a "wholesale client" and that neither you nor the entity you represent will directly or indirectly disseminate this document or its contents to "retail clients" within the meaning of section 761G of the Corporations Act 2001. MOODY'S credit rating is an opinion as to the creditworthiness of a debt obligation of the issuer, not on the equity securities of the issuer or any form of security that is available to retail investors. It would be reckless and inappropriate for retail investors to use MOODY'S credit ratings or publications when making an investment decision. If in doubt you should contact your financial or other professional adviser.

Additional terms for Japan only: Moody's Japan K.K. ("MJKK") is a wholly-owned credit rating agency subsidiary of Moody's Group Japan G.K., which is wholly-owned by Moody's Overseas Holdings Inc., a wholly-owned subsidiary of MCO. Moody's SF Japan K.K. ("MSFJ") is a wholly-owned credit rating agency subsidiary of MJKK. MSFJ is not a Nationally Recognized Statistical Rating Organization ("NRSRO"). Therefore, credit ratings assigned by MSFJ are Non-NRSRO Credit Ratings. Non-NRSRO Credit Ratings are assigned by an entity that is not a NRSRO and, consequently, the rated obligation will not qualify for certain types of treatment under U.S. laws. MJKK and MSFJ are credit rating agencies registered with the Japan Financial Services Agency and their registration numbers are FSA Commissioner (Ratings) No. 2 and 3 respectively.

MJKK or MSFJ (as applicable) hereby disclose that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by MJKK or MSFJ (as applicable) have, prior to assignment of any rating, agreed to pay to MJKK or MSFJ (as applicable) for appraisal and rating services rendered by it fees ranging from JPY200,000 to approximately JPY350,000,000.

MJKK and MSFJ also maintain policies and procedures to address Japanese regulatory requirements.

Actual credit performance data were essential to our approach ...



**“Without data you’re
just another person
with an opinion.”**

**—W. Edwards Deming (1900-
1993), *Data Scientist***

Objective (1): Empirical Foundation for Differentiated Regulatory Treatment

... which fosters convergence to common standards (“prudential anchor”).

- Analyze credit performance of infrastructure debt securities* and project loans to explore the possibility of a *differentiated* regulatory treatment as separate asset class
- Empirical foundation for lower capital charges, also for EMDE projects
 - Better understanding elevates credit risk analysis to a portfolio perspective
- **Scope of eligibility for differentiation fosters standardization**
 - Infrastructure debt better suited for widening (to less specialized) investor base
 - Greater transparency and comparability enhances efficient risk-sharing and price differentiation
 - Precondition for effective scale-up via capital mobilization through MDB tools and conditions (e.g., *Global Infrastructure Facility* (GIF) as platform)



Objective (2): Empirical Foundation for Differentiated Regulatory Treatment

... which fosters convergence to common standards (“prudential anchor”).

- **Focus on two important solvency regimes for insurers:**
 - EIOPA: Solvency II/SCR Standard Formula—Spread Risk Sub-Module (Art. 180)
 - IAIS: Credit risk factor in *Insurance Capital Standard* (ICS)
- **Supplementary analysis of project finance in Basel III framework (Dec. 2017)**
- **Use published credit risk parameters of rated infrastructure debt securities* and unrated project loans to derive differentiated capital charges using internal model-based approaches**
 - Focus on project loans (~ 80% of all infrastructure investments globally)
 - Assess proportionality of current regulatory methodologies (i.e., standardized approaches) without conceptual modification

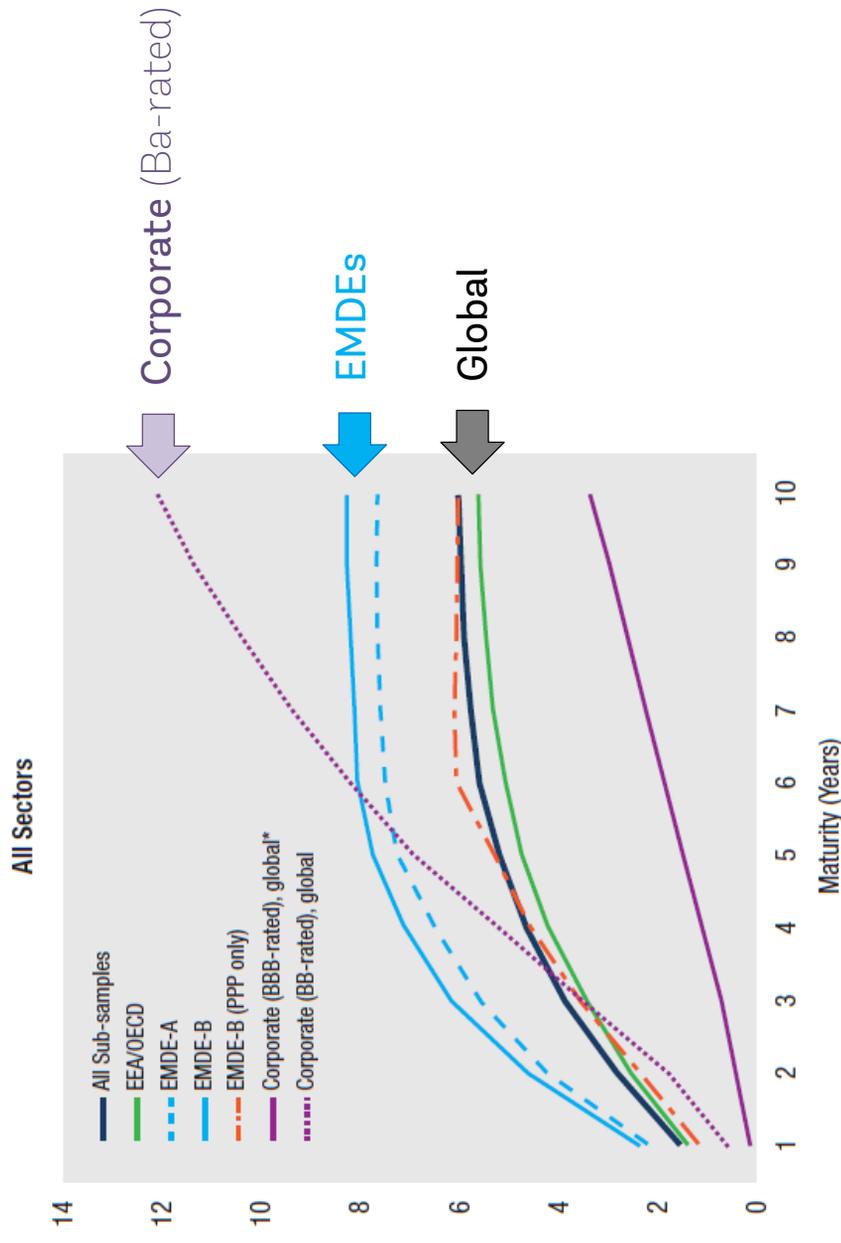
Credit Risk Profile of Project Loans (Infrastructure)

We find a high degree of resilience of project loans in both advanced and developing economies ...

- **Moody's report on unrated project loans (1995-2015)**
 - 6,108 projects* (407 defaults, 192 recoveries)
- **"Hump-shaped" credit risk profile**
 - Cumulative PDs flatten after five years (over 10-year horizon), and earlier for PPPs
 - Marginal PDs of project bonds converge to those of investment grade corporate debt

* / The larger sample (1983-2015) includes 6,389 projects, with 460 defaults and 237 ultimate recoveries; they have excluded from our analysis) for robustness.

Project Loans: Cumulative Default Probability (In percent)

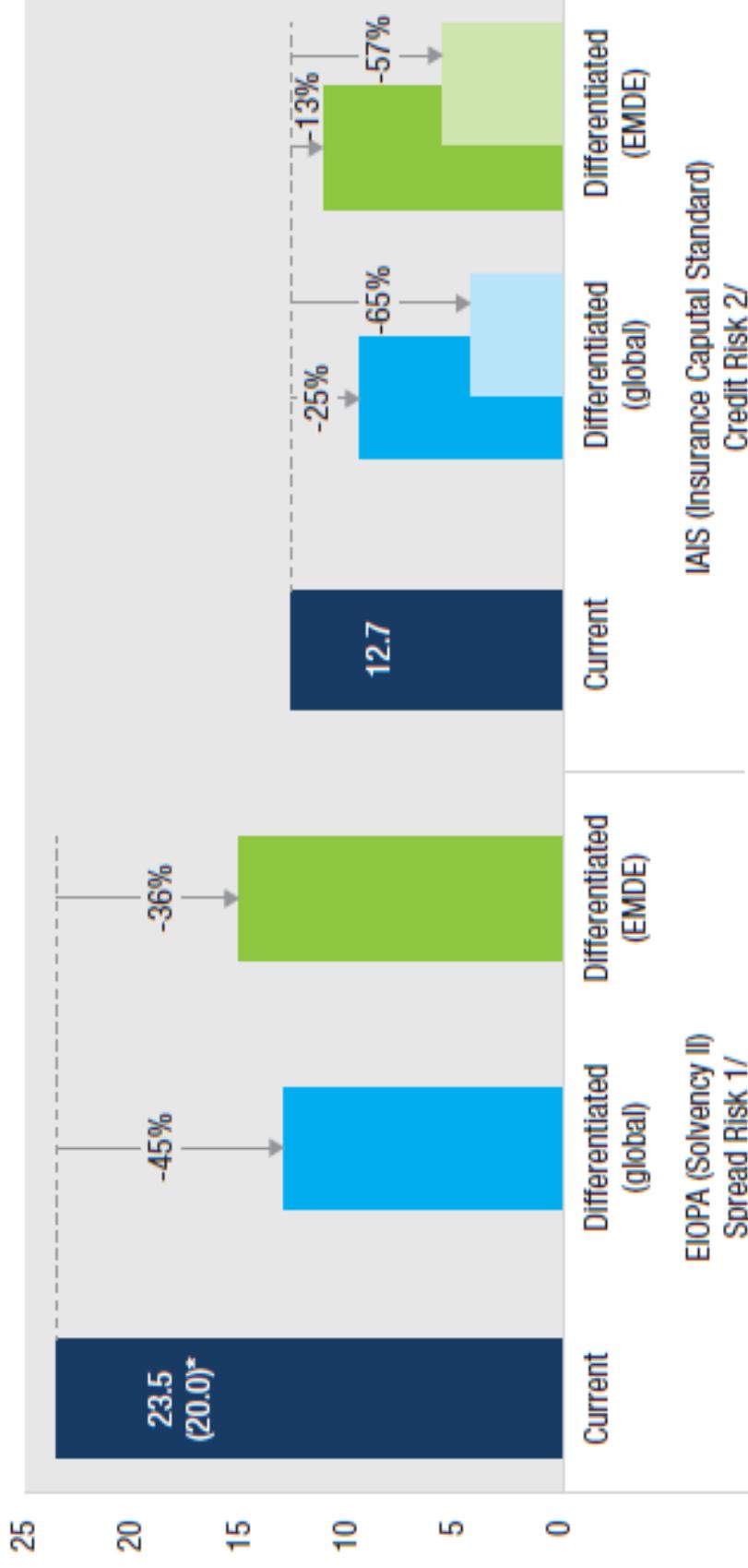


Sources: Jobst (2018) and Moody's Investors Service (2017). *Note:* the sub-samples refer to (i) all EEA and OECD member countries "EEA or OECD", (ii) all non-high income countries ("EMDE-A"), and (iii) all non-high income countries without EEA or OECD members (i.e., Bulgaria, Croatia, Mexico, Romania, and Turkey) ("EMDE-B" according to the sample selection in Moody's Investors Service (2017) over a study time period between 1995 and 2015.

Differentiated Capital Charges (1): Unrated Project Loans (Solvency II and ICS)

... result in a lower capital charge if standardized approaches recognize infrastructure as separate asset class ...

Differentiating infrastructure debt from corporate risk profile implied by existing standardized approaches

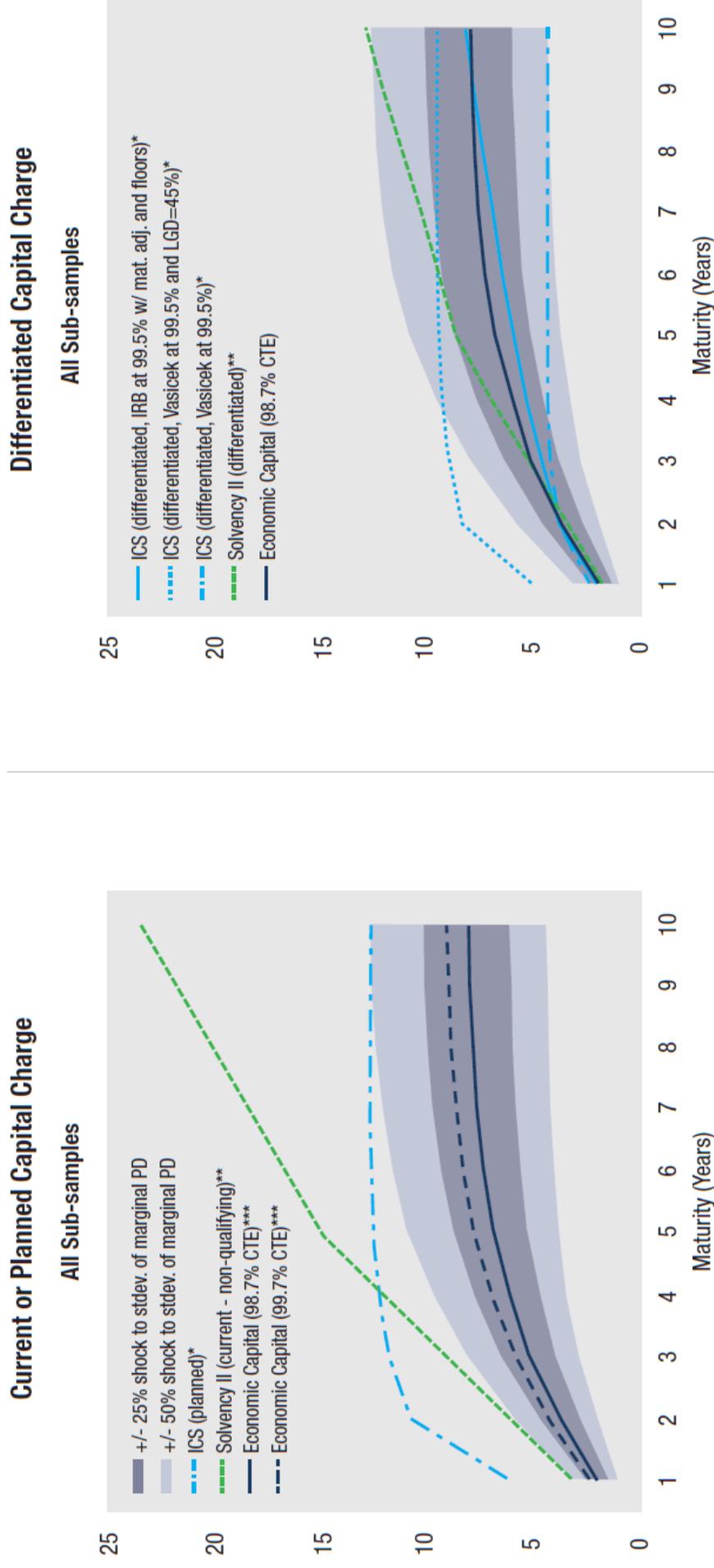


Sources: Basel Committee on Banking Supervision, EIOPA, IAIS, Jobst (2018), and Moody's Investors Service (2017). Note: */ reduced capital charge for qualifying infrastructure investment in EEA or OECD countries according to EU Regulation 2017/1542 (European Commission, 2017); †/ Solvency II Directive: current capital charge for bond and loan exposures under the original Solvency II SCR Standard Formula Spread Risk Sub-Module (which also applies to infrastructure debt: investment outside EEA or OECD member countries even if other criteria for qualifying investment were satisfied) and differentiated capital charge consistent with the average annual expected losses (estimated over a 10-year horizon) of unrated project loans in two samples — global (all sub-samples) and non-high income countries (EMDE-A) as defined in Moody's Investors Service (2017); 2/ Insurance Capital Standard (ICS); calibrated credit risk stress factor based on the cumulative default rate of unrated project loans in an adapted Vasiček (2002) model, with actual and fixed LGD of 45 percent (consistent with the foundation IRB (F-IRB) approach under the finalized Basel III framework) — the patterned bar charts show the results for the use of the actual recovery rates (which are much lower for unrated project loans).

Differentiated Capital Charges (2): Unrated Project Loans (Solvency II and ICS)

... and aligns term structure of capital charges with the actual credit risk profile.

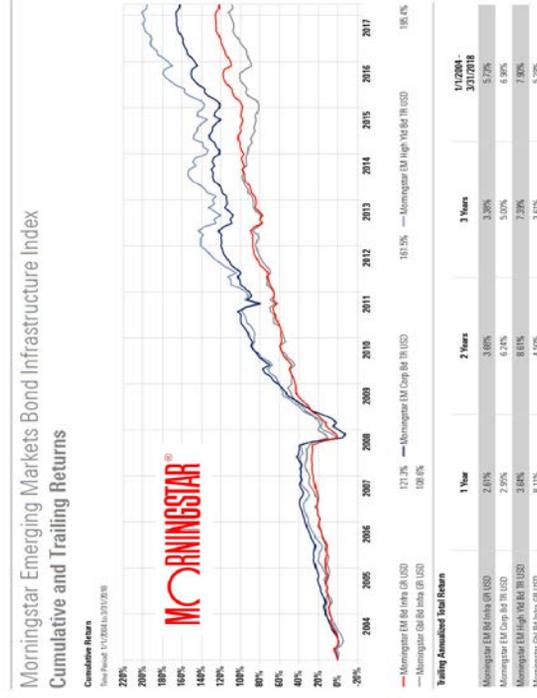
Appendix Figure 17. Unrated Project Loans—Capital Charge under Differentiated Regulatory Treatment (ln percent)



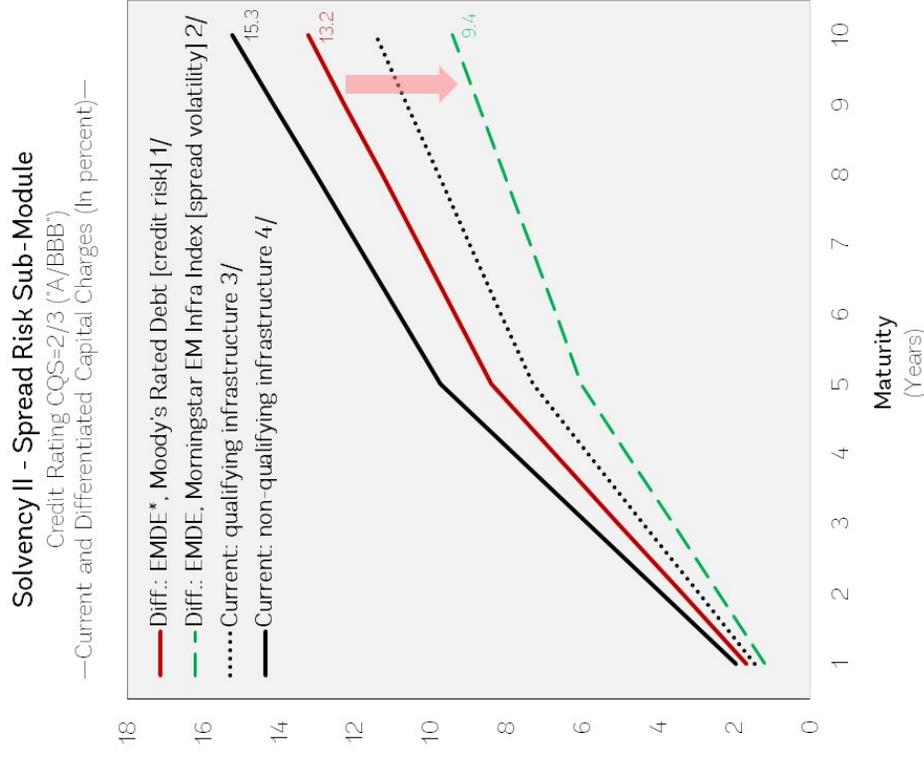
Differentiated Capital Charges (3): Rated Infra Debt (Solvency II)

New Morningstar[®] EM Infrastructure Index makes it possible to calibrate the capital charge based on spread risk.

- Solvency II capital charge on rated infra debt
 - "A-/BBB+" -rated Morningstar[®] index of infra corporate bonds vs.
 - "A/Baa" -rated infra debt securities (Moody's)
 - Lower capital charge: market-implied expected losses of index below that of similarly rated Moody's infra debt.



Average annual VaR_{99.5%} = 6.71%

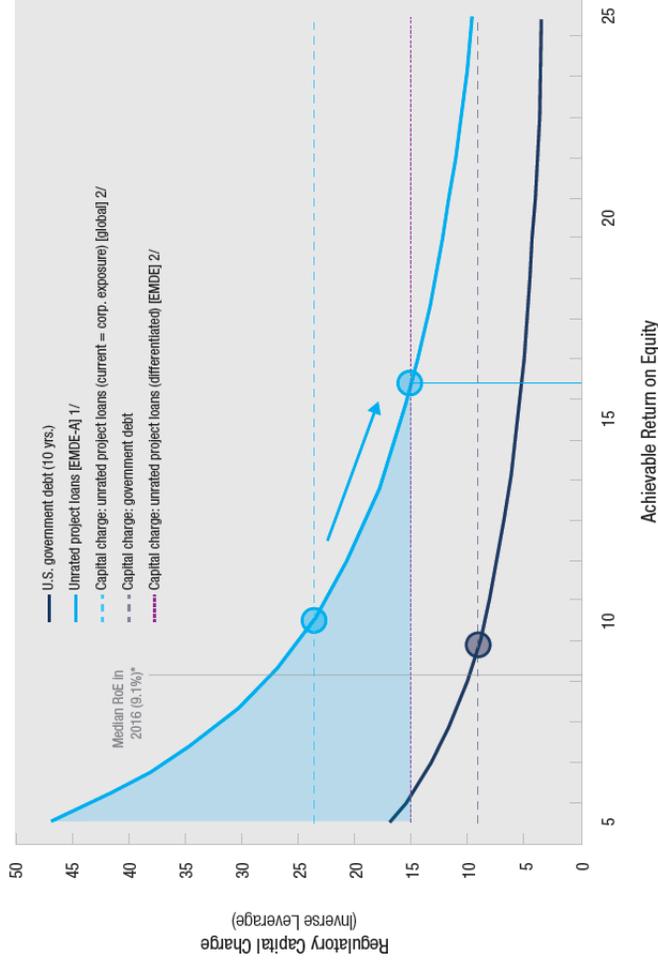


Sources: Bloomberg L.P.; EIOPA, European Commission, Moody's Investors Service (2016-2017) and Jobst (2018). *Note:* * / EMDE=emerging market and developing economies, which covers all non-high income countries as defined by sub-sample "EMDE-A" in Moody's Investors Service (2017) over a study time period between 1995 and 2015; 1/ based on data published by Moody's Investors Service (2016-17); 2/ Morningstar Emerging Markets Bond Infrastructure Index (A-/BBB+ rating, price return USD, unhedged, mod. duration 6.5 years)—99.5% VaR valuation impact of average annualized spread volatility between 2004 and end-March 2018; 3/ based on EU Regulation 2017/1542 (European Commission, 2017); 4/ equivalent to risk factors for general fixed income exposures (bonds and loans).

Although regulatory disincentives may be just one of several impediments to the development of infrastructure as a separate asset class ...

... even a modest capital reduction can have a significant impact RoE ($\uparrow 50\%$) \rightarrow helps maximize finance for development through long-term capital.

Figure 12. Solvency II (Europe): Return on Equity from Investment in Project Loan vs. Government Debt Securities as Function of Regulatory Capital Charges (in percent)



Sources: Bloomberg L.P., Moody's Investors Service (2017g) and author.

Note: the calculation is based on the annual yield (less the risk-free rate of 1.0 percent) after tax (35 percent) and 10-year U.S. government debt yield at 2.31 percent as of end-Sept. 2017; ^{1/} median return on equity (RoE) of European insurers as of mid-2016 was 9.1 percent (EOPA, 2017a); ^{2/} average infrastructure loan rate in the U.K. (4.3 percent) according to Institute and Faculty of Actuaries (2015) at end-2014 and scaled to projects in EMDEs (4.6 percent) consistent with the differential yield of infrastructure debt securities in advanced and developing economies; ^{3/} using the Solvency II Spread Risk Sub-Module (European Commission, 2015 and 2017) based on empirical credit risk factors for project loans in sample "EMDE-A," assuming that unrated exposures cannot be classified as "qualifying investment" and are subject to a capital charge consistent with conventional corporate exposures (loans/bonds) of credit quality score (COS) of between 3 ("Ba") and 4 ("Ba") with duration of 10 years (which is the average tenor of infrastructure project loans according to Ehlers (2014) and OECD (2015a)).

Implications of Findings—Policy Discussion (1)

Differentiated Treatment of Infrastructure

- **Regulatory differentiation provides “prudential anchor” for infrastructure finance as separate asset class**
 - Rising investor demand for clear asset classification
 - Our results guide cross-validation of internal models and help smaller insurers w/o internal models
 - Signaling effect for other long-term institutional investors, such as pension funds
- **Greater differentiation supports long-term perspective of G20 regulatory reforms**
 - Efficient risk-sharing between banks and insurers due to complementary maturity preference
 - Bank lending for riskier, initial phase of projects (“greenfield”) and liquidity backstop
 - Insurers as financier of mature projects (“brownfield”)

Implications of Findings—Policy Discussion (2)

Differentiated Treatment of Infrastructure

- **G20 Policy Agenda**
 - G20 Infrastructure Working Group: mobilizing private resources to develop resilient infrastructure against climate change and disasters
 - Self-insurance: climate-smart infrastructure helps mitigate impact of transition risk on existing assets that support insurers' current liabilities ("stranded assets")
 - Part of portfolio re-balancing towards sustainable investment → *Network for Greening the Financial System (NGFS)*
 - Financial Stability Board (FSB): post-implementation evaluation of post-crisis financial regulatory reforms, with focus on infrastructure finance

Thank you!
Questions?

e-mail: ajobst@worldbank.org

References

Main reference:

- Jobst, Andreas A., 2018, "Credit Dynamics of Infrastructure Investment: Considerations for Financial Regulators," Policy Research Working Paper No. 8373, March 22 (Washington, D.C.: World Bank Group), available at <http://documents.worldbank.org/curated/en/606411522326750586/pdf/124720-PUBLIC-Infrastructure-Regulation-Report-Mar28.pdf> (Report)
- <http://documents.worldbank.org/curated/en/125511521722022110/Credit-risk-dynamics-of-infrastructure-investment-considerations-for-financial-regulators> (Working Paper)

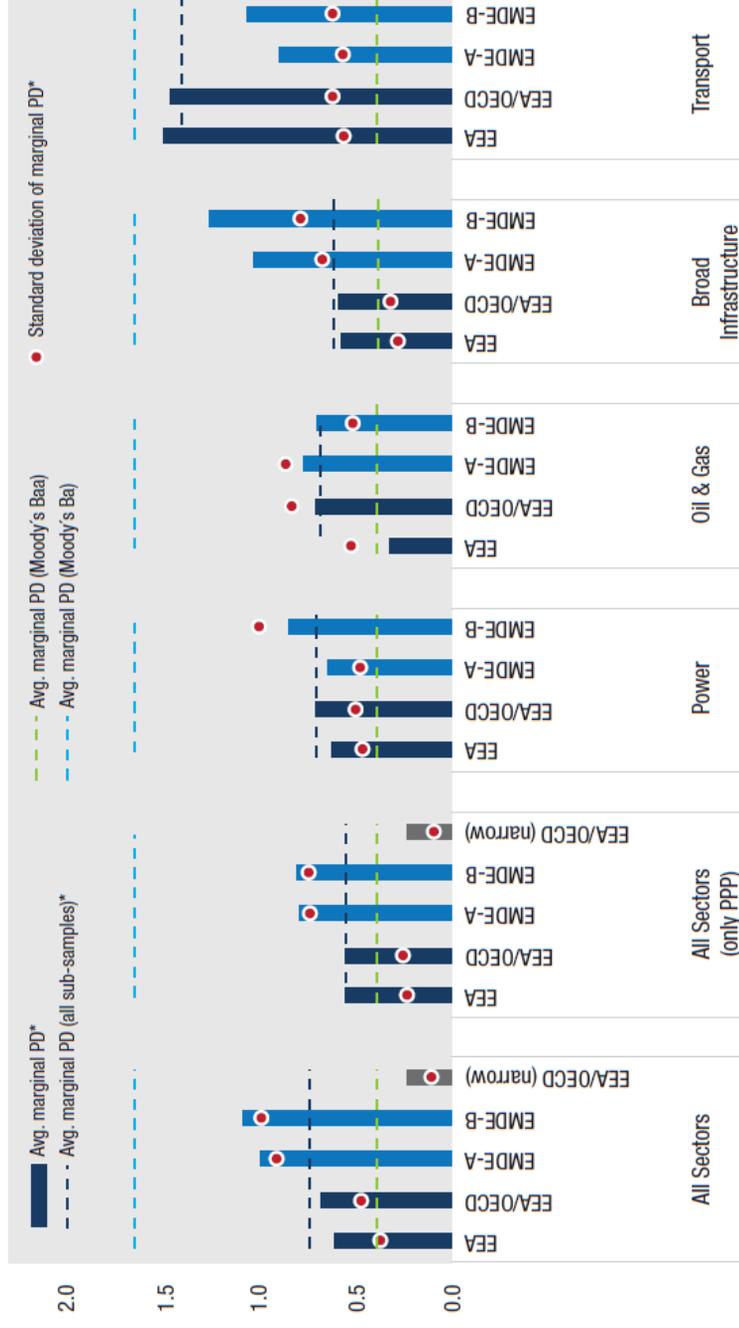
Related literature:

- EIOPA, 2015, "Infrastructure Investments by Insurers," Discussion Paper No. CP-15-003, March 27 (Frankfurt am Main: European Insurance and Occupational Pensions Authority), available at https://eiopa.europa.eu/Publications/Consultations/EIOPA-CP-15-003-Discussion-paper_on_Infrastructure-Investments_for_public.pdf.
- European Commission, 2016, "Commission Delegated Regulation (EU) 2016/467 of 30 September 2015 Amending Commission Delegated Regulation (EU) 2015/35 Concerning the Calculation of Regulatory Capital Requirements for Several Categories of Assets Held by Insurance and Reinsurance Undertakings," *Official Journal of the European Union* L 85/6, April 2 (Brussels: European Commission), available at http://data.europa.eu/eli/reg_del/2016/467/oj.
- -----, 2017, "Commission Delegated Regulation (EU) 2017/1542 of 8 June 2017 Amending Delegated Regulation (EU) 2015/35 Concerning the Calculation of Regulatory Capital Requirements for Certain Categories of Assets Held by Insurance and Reinsurance Undertakings (Infrastructure Corporates)," *Official Journal of the European Union* L 236/14, September 14 (Brussels: European Commission), available at http://data.europa.eu/eli/reg_del/2017/1542/oj.
- IAIS, 2017, "Public 2017 Field Testing Technical Specifications (Instructions for the May 2017 Quantitative Data Collection Exercise)," July 21 (Basel: International Association of Insurance Supervisors), available at <https://www.iaisweb.org/file/67655/public-2017-field-testing-technical-specifications>.
- OECD, 2015, "Infrastructure Financing Instruments and Incentives 2015," Directorate for Financial and Enterprise Affairs (Paris: Organization for Economic Co-operation and Development), available at <http://www.oecd.org/finance/private-pensions/infrastructure-financing-instruments-and-incentives.pdf>.
- Ruiz-Núñez, Fernanda and Zichao Wei, 2015, "Infrastructure Investment Demands in Emerging Markets and Developing Economies," World Bank Working Paper Series No. 7414, September 17 (Washington, D.C.: World Bank Group), available at <http://documents.worldbank.org/curated/en/141021468190774181/infrastructure-investment-demands-in-emerging-markets-and-developing-economies>.
- Schwartz, Jordan Z., Ruiz-Núñez, Fernanda and Jeff Chelsky, 2014, "Closing the Infrastructure Finance Gap: Addressing Risk," in: Heath Alexandra and Matthew Read (eds.) *Financial Flows and Infrastructure Financing*. Conference Proceedings, March 20-21 (Sydney: Reserve Bank of Australia), available at <https://www.rba.gov.au/publications/confs/2014/pdf/conf-vol-2014.pdf>.

BACKGROUND SLIDES— DETAILED ANALYSIS

The average marginal PD of project loans is about 1/3 higher in EMDs, but some sectors are below the global average (oil & gas, transport).

Appendix Figure 14. Unrated Project Loans (1983-2015)—Probability of Default (PD) (In percent)



Sources: Moody's Investors Service (2017g) and author.

Note: the average and standard deviation of the marginal probability of default is calculated over a 10-year time horizon; the total sample of project loans in the Moody's Analytics Project Finance Data Consortium dataset comprises ten sectoral categories, of which three sectors (power, oil & gas, and (broad) infrastructure (and its sub-category "transport")) are shown separately. For the original study period (1983-2015), the share of the total number of defaults in the selected sectors for samples "EEA or OECD," "EMD-A" and "EMD-B," respectively, is as follows: power (40/16/32 percent), oil & gas (10/33/17 percent), and infrastructure (30/9/9 percent), of which a sub-sample for "transport" (23/2/2 percent) was created.

The recovery rate of project loans is virtually the same in EMDEs, similar to that of senior secured corporate bank loans despite high gearing and long tenors.

Appendix Figure 15. Unrated Project Loans (1983–2015)—Recovery Rate (In percent)



Sources: Moody's Investors Service (2017g) and author.

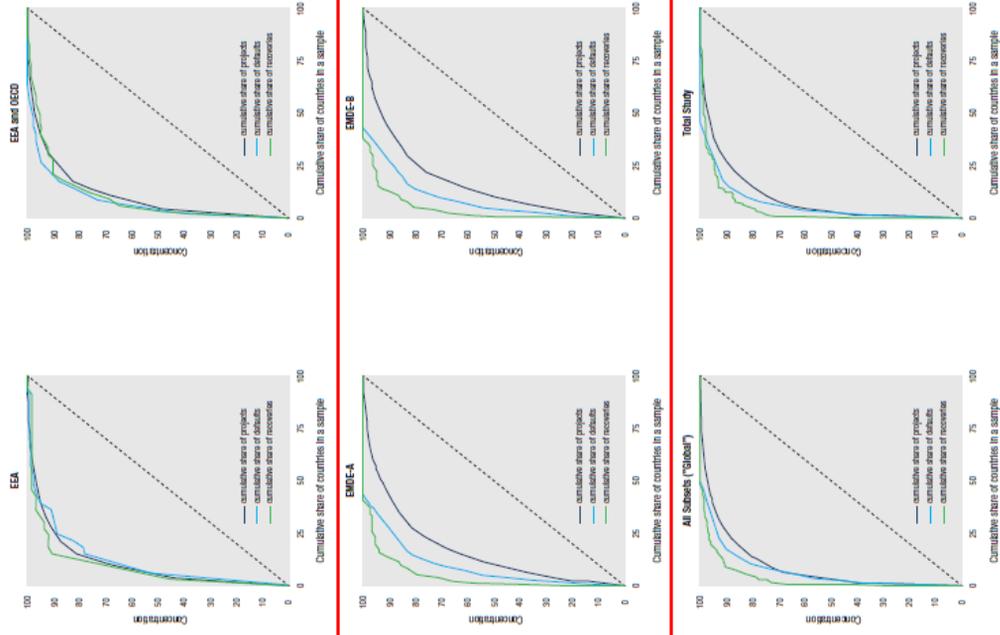
Note: the recovery rate represents the "ultimate recovery" (outside the results from distressed debt sale and work-out process) and is based on cohorts of loans with the same origination year, the standard deviation of the recovery rate is calculated as a cross-sectional measure for each sample over a 10-year time horizon (which is missing for some sub-samples due to lack of robustness); the total sample of project loans in the *Moody's Analytics Project Finance Data Consortium* dataset comprises ten sectoral categories, of which three sectors (power, oil & gas, and (broad) infrastructure (and its sub-category "transport")) are shown separately.

Lorenz Curves and Credit Risk Parameter Stability

No distortionary composition effect in EMDE sample

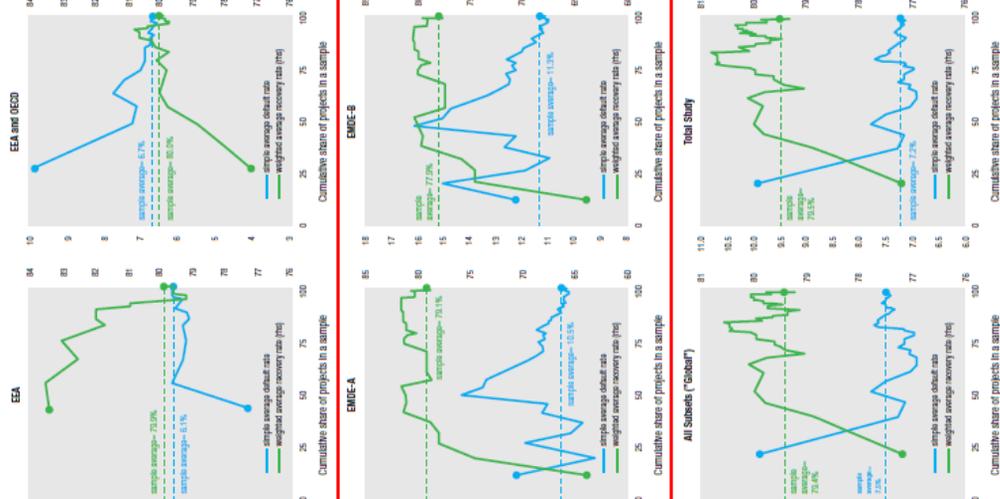
Target Group
(EMDE)
A – 81 countries
B – 76 countries

Appendix Figure 7. Lorenz Curves (Composition Effect): Sample Concentration of Projects, Defaults and Recoveries (in percent)



Sources: Moody's Investors Service (2017g).
Note: The charts show the change in the concentration of projects, defaults, and recoveries (on a cumulative basis) in each sample subset as the proportion of countries (ranked in order of project count) included in each subset increase (i.e., countries are ordered based on the descending number of projects in the sample).

Appendix Figure 8. Credit Risk Factor Stability (Composition Effect): Cross-Sectional Changes in Default and Recovery Rates (in percent)



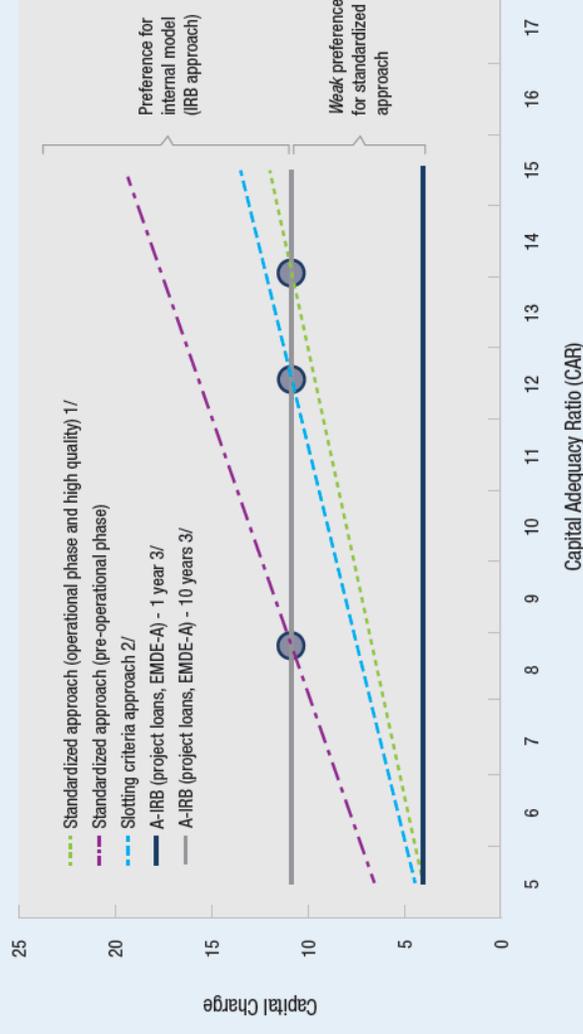
Sources: Moody's Investors Service (2017g) and author.
Note: The charts show the stability of the sample average loss ratio for default rate and weighted average recovery rate after controlling for differences in the count of defaults and recoveries, with the former being about twice as frequent.

Banking: Differentiated Capital Charges for Project Loans

In percent of exposure amount

- **Standardized approaches under Basel III (BCBS, 2017)**
 - Inconsistent with actual credit performance
 - Standardized capital charge of 10.4% (assuming CAR=8%) for pre-operational projects about 10x higher
- Internal model-based approach (using actual data):
 - **1-year** horizon: 3.2% and 4.4% for global/EMDE projects
 - **10-year** horizon: 9.4% and 10.7% for global/EMDE projects

Figure 11. Basel III Framework (Banking): Regulatory Treatment of Unrated Project Loans—Analysis of Marginal Impact (In percent)



Sources: BCBS (2017), Moody's Investors Service (2017g) and author.

Note: 1/ specialized lending for which a rating is not available but is deemed to be "high quality" the credit risk weight is 80 percent (else 100 percent); 2/ if banks do not meet the requirements for the estimation of the PD under the *foundation internal ratings-based (F-IRB)* approach, they are required to map their internal risk grades to five supervisory categories, each of which is associated with a specific risk weight (*slotting criteria approach*) – for illustration, unrated project loans were assumed to be consistent with a "good" classification (i.e., CQS=4), which would result in a risk weight of 90 percent; 3/ capital charge under the *advanced internal ratings-based (A-IRB)* approach (but without prudential floors to PD and LGD) with actual credit risk parameters of (unrated) project loans in all non-high income countries ("EMDE-A sample") over a risk horizons of 1 year and 10 years, respectively.

BACKGROUND SLIDES— TECHNICAL SPECIFICATION

Solvency II – Spread Risk Sub-Module [via Credit Risk]

- Spread Risk Sub-module:

$$SCR_{Spread Risk} = \begin{cases} D \times b_{i,j,k=1} & D \leq 5 \text{ years} \\ a_{i,j,k \in [2-5]} + (D - 5 \times (k - 1)) \times b_{i,j,k \in [2-5]} & D > 5 \text{ years} \end{cases}$$

- Follow indirect estimation approach (EIOPA, 2013 and 2015) by adjusting spread risk charge attributable to credit risk for corporates

$$SCR_{Spread Risk}_{Infra} = SCR_{Spread Risk} - \varphi_{j,k_{qualifying}}$$

with reduction factor $\varphi_{j,k_{qualifying}}$ for “qualifying infrastructure” with j -rated exposures with duration D in duration bucket k .

- Apply differentiated approach by focusing on unrated project loans, which are treated like rated corporate debt or loans with CQS $j = 3$ (but only for “qualifying infrastructure” in EEA or OECD countries) so that

$$SCR_{Spread Risk}_{Infra_{unrated}} = SCR_{Spread Risk} - \gamma_{j=unrated,k}^{EEA/OECD}$$

based on the general risk factor elasticity of current capital charge for rated infrastructure debt to expected loss $\mathbb{E}(L_{j,k}^{corp})$ for $j \in \{0; 1; 2; 3; 4\}$ (implied by Moody’s credit ratings of non-financial corporates) and assuming that

$$\frac{d\varphi_{j,k_{qualifying}}}{d\mathbb{E}(L_{j,k}^{corp})} \approx \frac{d\gamma_{j=unrated,k}^{EEA/OECD}}{d\mathbb{E}(L_{j=unrated,k}^{EEA/OECD})} \text{ s.t. } \frac{b_{i,j=unrated,k \in [1,2]}}{\mathbb{E}(L_{j=unrated,k \in [1,2]}^{EEA/OECD})}$$

- Scaling based on linear sensitivity of $b_{i,j,k=1,2}$ to expected loss: $15.481 \times \mathbb{E}(L_{j,k=1}^{corp}) + 1.1356$ and $2.1344 \times \mathbb{E}(L_{j,k=2}^{corp}) + 0.6558$.

ICS-Credit Risk Factor [via adapted Vasicek (2002) model]

- Current credit risk calibration follows the asymptotic single risk factor model of internal ratings-based (IRB) approach for credit risk Basel III (BCBS, 2017) but also accounts for deterioration of obligor's creditworthiness (→ adapted Vasicek (2002) model)
- Capital requirement $K = LGD \times PD_{t_{stress}}^{mar} + \underbrace{downgrade\ risk}_{\underbrace{\left(\frac{\Phi^{-1}(\mathbb{E}(PD_t^{mar})) - \sqrt{R}\Phi^{-1}(\alpha)}{\sqrt{1-R}} \right) + \exp(-rt)}_{\text{stressed default rate}} \frac{\mathbb{E}(B_t) - B_{t_{stress}}}{B_t}}_{\text{downgrade risk}}$

where $PD_{t_{stress}}^{mar}$ is the stressed marginal default rate, LGD is the loss-given-default, r is the annualized bond yield,

- *current* bond price at time: $B_t = \exp(-rT)(1 - LGD \times PD_T^{cumul})$
- *expected* bond price at time: $\mathbb{E}(B_t) = \exp(-r(T-t))(1 - LGD \times PD_{T-t}^{cumul})$, where $PD_{T-t}^{cumul} = \frac{\mathbb{E}(PD_T^{cumul}) - \mathbb{E}(PD_t^{mar})}{1 - \mathbb{E}(PD_t^{mar})}$
- *stressed* bond price: $B_{t_{stressed}} = \exp(-r(T-t))(1 - LGD \times PD_{T-t_{stress}}^{cumul})$
- Under risk-neutrality: $K = LGD \times \Phi \left(\frac{\Phi^{-1}(\mathbb{E}(PD_t^{mar})) - \sqrt{R}\Phi^{-1}(\alpha)}{\sqrt{1-R}} \right) + \exp(-rt) \times LGD \frac{\bar{PD}_{T-t_{stress}}^{cumul} - \bar{PD}_{T-t}^{cumul}}{1 - LGD \times \bar{PD}_T^{cumul}}$
- Aligned with *foundation* IRB approach: $K = 0.45 \times \left(\Phi \left(\frac{\Phi^{-1}(\mathbb{E}(PD_t^{mar})) - \sqrt{R}\Phi^{-1}(\alpha)}{\sqrt{1-R}} \right) + \exp(-rt) \frac{\bar{PD}_{T-t_{stress}}^{cumul} - \bar{PD}_{T-t}^{cumul}}{1 - 0.45 \times \bar{PD}_T^{cumul}} \right)$

Economic Capital Model [via Generalized Extreme Value]

- Extreme value theory (EVT) as general statistical concept to specify asymptotic tail behavior of the marginal loss rate $L_{i,j}^{mar}$ parametric specification of the general GEV c.d.f, which for the order statistic $\mathcal{X}_{L_{i,j}^{mar}}$ is defined as

$$G_{L_{i,j}^{mar}}(x) = \exp\left(-\left(1 + \frac{\xi_{i,j}(x - \mu_{i,j})}{\sigma_{i,j}}\right)^{-1/\xi_{i,j}}\right) \quad \text{if } 1 + \frac{\xi_{i,j}(x - \mu_{i,j})}{\sigma_{i,j}} \geq 0$$

- Moments are calculated as

$$\mu_{i,j}^{mar} = \mathbb{E}(PD_{i,j}^{mar})\mathbb{E}(LGD_{i,j}^{mar}) + \rho(PD_{i,j}^{mar}, LGD_{i,j}^{mar})\sigma_{PD_{i,j}^{mar}}\sigma_{LGD_{i,j}^{mar}}$$

$$\sigma_i^{mar} = \sqrt{\frac{\pi^2}{6}\left(\mu_{PD_i^{mar}}^2\sigma_{LGD_i^{mar}}^2 + \mu_{LGD_i^{mar}}^2\sigma_{PD_i^{mar}}^2 + \sigma_{PD_i^{mar}}^2\sigma_{LGD_i^{mar}}^2\right)} \quad \text{if } \xi=0$$

with $\hat{\xi}_{i,j}$ so that quantile function $G_{L_{i,j}^{mar}}^{-1}(0.987) = \mu_{i,j}^{mar} + \frac{\sigma_i^{mar}}{\hat{\xi}_{i,j}}\left((- \ln(0.987))^{-\hat{\xi}_{i,j}} - 1\right) = VaR_{a=0.995, L_{i,j}^{cumul}}$, for asset class i with credit quality step (CQS) $j \in \{1, \dots, 6\}$, where $VaR_{a=0.995, L_{i,j}^{cumul}}$ represents the empirical quantile value of marginal losses.

- Capital requirement as density forecast: $K = \sum_{m=1}^M CTE_{0.987, m, L_{i,j}^{mar}} = \mathbb{E}\left(\frac{x - \alpha_{i,j}}{\beta_{i,j}} \mid \frac{x - \alpha_{i,j}}{\beta_{i,j}} \geq G_{L_{i,j}^{mar}}^{-1}(0.987)\right) = VaR_{0.987, m, L_{i,j}^{mar}}$



AN INITIATIVE OF



WORLD BANK GROUP



GIF 2018

ADVISORY COUNCIL MEETING

PANEL

Invest in Climate Smart Infrastructure

Moderator: John Roome, Senior Director, Climate Change, World Bank

APRIL 18, 2018

OVERVIEW

Investing in sustainable infrastructure is key to delivering on the Sustainable Development Goals (SDGs) of: “ensuring access to affordable, reliable, sustainable, and modern energy for all”, “building resilient infrastructure, promoting inclusive, sustainable industrialization, and fostering innovation” and “Taking urgent action to combat climate change and its impacts”- SDG Goal 7, 9 and 13 respectively.

With the Paris Agreement 2 years behind us, mobilizing the investment required to meet the shared goal of limiting global warming to, at most, 2°C, while adapting to more unpredictable climate events, still presents a challenge to the global community. Within this milieu, NDCs and the strong political signal delivered by the Paris Agreement present numerous investment opportunities for a wide range of public and private finance actors¹.

Climate finance flows reached a record high of \$437 billion dollars in 2015, followed by a 12% drop in 2016 to \$383 billion, driven in 2015 by a surge in private renewable investments, particularly in China, and in rooftop solar power in the U.S. and Japan². According to the IEA, annual investments in solar rooftop photovoltaic (PV) and onshore wind capacity additions outpaced fossil fuel power investments by over 100% during this period.

The IFC has estimated that the historic global agreement on climate change adopted in Paris will help open nearly \$23 trillion in opportunities for climate-smart investments in emerging markets between now and 2030³. The findings were based on the national climate-change commitments and underlying policies of 21 emerging-market economies, representing 48 % of global emissions, and identified sectors in each region where the potential for investment is greatest. These identified regions and sectors include:

East Asia and the Pacific: green buildings—where China, Indonesia, the Philippines, and Vietnam show a climate-smart investment potential of \$16 trillion.

Latin America and the Caribbean offer the next largest opportunity—particularly in sustainable transportation, where the potential for investment in Argentina, Brazil, Colombia, and Mexico is about \$2.6 trillion.

South Asia: Opportunities are mostly seen in climate-resilient infrastructure, where \$2.5 trillion of opportunities exist in India and Bangladesh.

Sub-Saharan Africa represents a \$783 billion opportunity—particularly for clean energy in Cote d’Ivoire, Kenya, Nigeria, and South Africa.

Eastern Europe, with its biggest markets—Russia, Serbia, Turkey, and Ukraine—shows a combined investment potential of \$665 billion, mostly in energy efficiency and new green buildings.

Middle East and North Africa: the total climate-investment potential for Egypt, Jordan, and Morocco is estimated at \$265 billion, over a third of which is for renewable-energy generation, while 55 percent (\$146 billion) is for climate-smart buildings, transportation, and waste solutions.

At COP23 in November 2017, the international community, individual Governments and non-state actors reinforced their commitment to supporting implementation of the Paris Agreement on Climate Change. It is expected therefore that over 2018, countries will ramp-up preparations to scale up ambition, to meet the goal of an at least 2°C limit on

¹ Adapted. Climate Policy Initiative. 2017. Global Landscape of Climate Finance 2017 (October). <https://climatepolicyinitiative.org/wp-content/uploads/2017/10/2017-Global-Landscape-of-Climate-Finance.pdf>

² International Finance Corporation. 2016. Climate Investment Opportunities in Emerging Markets - An IFC Analysis. https://www.ifc.org/wps/wcm/connect/51183b2d-c82e-443e-bb9b-68d9572dd48d/3503-IFC-Climate_Investment_Opportunity-Report-Dec-FINAL.pdf?MOD=AJPERES

³ International Finance Corporation. 2016. Climate Investment Opportunities in Emerging Markets - An IFC Analysis. https://www.ifc.org/wps/wcm/connect/51183b2d-c82e-443e-bb9b-68d9572dd48d/3503-IFC-Climate_Investment_Opportunity-Report-Dec-FINAL.pdf?MOD=AJPERES

global temperature increases. Galvanizing accelerated action on this shared agenda, however requires multi-stakeholder coalitions, in-house government champions and replicable and scalable examples of success that send clear and direct policy and market signals and inspire greater ambition.

Climate Smart Infrastructure: An Investment Proposition and Development Imperative

It is approximated that US\$90 trillion in infrastructure investment is needed globally by 2030 to achieve global growth expectations, particularly in developing countries⁴. These investments are needed to replace ageing infrastructure in advanced economies and to accommodate higher growth and structural change in emerging market and developing countries. To achieve this, infrastructure investment needs to be both scaled up, and, due to climate risk, integrate climate objectives. In the context of the panel, climate smart infrastructure can be framed as infrastructure that is low carbon-emitting, encourages energy and/or carbon efficiency in its provision of services, and/or is designed, built, and maintained to cope with climate events in order to maintain its essential function.⁵ Therefore, ensuring that infrastructure is climate smart and resilient, and can be financed with the appropriate cost of capital through reducing climate risk will be critical. According to the New Climate Economy Global Commission on Economy and Climate, shifting to low-carbon infrastructure could add as little as 5% to upfront investment costs in 2015-2030, and because these costs could be offset by resulting energy and fuel savings, the investment proposition is convincing. MDBs and other financial actors have a key role to play in maximizing finance for development toward climate smart infrastructure.

The development imperative for investing in climate-smart, resilient infrastructure is also an urgent one for the world to adapt to the climate impacts that are already locked-in and to protect the poorest and most vulnerable people. Ensuring new infrastructure is built to deliver sustainability is the only way to meet the global climate change goals, and to guarantee long-term, inclusive and resilient growth.

Too often however, infrastructure and climate policies exist in separate silos, and the close links between infrastructure investment and climate change are often not considered in global infrastructure initiatives, and in many national and local government planning processes. The investment decisions made over the next 1-2 years will start to lock in for future decades either a climate-smart, inclusive growth pathway, or a high-carbon, inefficient and unsustainable pathway. The window for integration climate smart decisions into infrastructure policy, planning and projects is narrow and closing fast. With low interest rates and rapid technological change, we have the opportunity for sustainable infrastructure-led growth and the expansion of cross-border infrastructure investment, especially to developing countries.

Climate Smart Infrastructure: Investment Challenges and Opportunities

Climate change and related policy responses, such as those triggered by the Paris agreement, present a series of opportunities as well as economic and financial risks to which investors must respond. Institutional investors represent one of the largest pools of private capital in the world, overseeing approximately 100 trillion in assets globally⁶. For this group, low carbon technologies, energy efficiency and renewable energy present significant investment opportunities. In terms of actual and potential infrastructure assets exposed to climate risks however, mitigation of climate change is essential for the safeguarding of long term investments and ensuring stranded asset risk and other losses from climate change are minimized. Better Growth, Better Climate, for example estimated that

⁴ NCE. 2015. Ensuring new infrastructure is climate-smart. Working paper. http://static.newclimateeconomy.report/wp-content/uploads/2014/08/NCE_SynthesisReport.pdf

⁵ Adapted: GIF Operating Guidelines 7-a. Union of Concerned Scientists. 2017. Built to Last. <https://www.ucsusa.org/sites/default/files/attach/2017/11/gw-whitepaper-smart-infrastructure.pdf>

⁶ Arezki, Rabah et al. IMF Working Paper. From Global Savings Glut to Financing Infrastructure: The Advent of Investment Platforms. 2016. International Monetary Fund/

around US\$1.1 trillion of energy-sector assets are at risk of stranding if financial markets fail to anticipate the transition to low-carbon energy.

Other issues such as regulatory uncertainty, project bankability, the lack of data about asset performance, and the institutional capacity of procuring governments are prohibitive factors that are perceived to be greater when considering investment in climate smart infrastructure⁷. Furthermore, the absence of a long track record makes it difficult for investors to decide on target returns and asset allocation, while the risk profile is usually sub-investment grade, and therefore outside the risk appetite that dominates the bulk of institutional balance sheets. In addition, the absence of local expertise in smaller markets makes individual credit review impossible or excessively onerous for projects outside of a few large middle-income countries. Atop these factors, a lasting challenge comes with convincing investors to participate in a broad range of more climate smart projects across sectors and countries, while differentiating between the various climate smart infrastructure projects for the most favorable investment.

Clear, long-term legislative frameworks are critical to Institutional Investors ability to assess and manage climate-related risks and to invest in opportunities that support a low carbon, more energy efficient and climate resilient world. Climate Policy initiative (CPI) finds that if all policy barriers were removed and investors optimized their renewable energy related investment practices for example, institutional investors could supply 25% to 50% of the investment needed to fund just renewable energy projects through 2035.

Other factors limiting institutional investment in more climate smart and renewable energy infrastructure projects:

- Some institutions have short-term needs for liquidity and cannot invest in long-term assets;
- Many institutions (particularly pension funds) are too small to justify building a dedicated team for direct project investment;
- All institutions require significant liquidity in their investment portfolios, to meet regulatory requirements and ensure their financial security, and are limited in the amount of illiquid assets they can own (such as project debt);
- Financial innovation is necessary to align the risk profile of assets with the needs of institutional investors;
- Institutional investors must diversify across investment options to reduce investment risk, which limits their exposure to a single asset class like renewable energy for example.

As a result of these limiting factors, and the investment options available, institutional investors may not be able to invest at sufficient scale to transform the cost of financing renewable energy.

Amidst these challenges, the opportunities for investors however are numerous. The recent exponential advances in clean technologies combined with their dramatic drop in prices continued in 2017, have ushered in a new era for private sector led climate-smart infrastructure investment and development. Under the canopy of climate smart infrastructure, renewable energy infrastructure for example has the potential to produce a steady yield over a long period of time, paired with limited technology and construction risk. Furthermore, renewable energy projects have a limited correlation to other assets, especially because these assets do not rely on fluctuating commodity prices. Investors have been quick to see the opportunity, driven by increasing demand for clean and cost-effective energy. More than half of 2,378 major infrastructure deals, worth an estimated £916 billion, were in renewable energy, a 9% rise since 2017, according to Prequin⁸.

⁷ IFC. Note 36. 2017. Mobilizing Institutional Investments into Emerging Market Infrastructure. <https://www.ifc.org/wps/wcm/connect/756a1ed7-ea19-4d5d-b4a7-687a0858cde8/EMCompass+Note+36+MCP+FINAL+3-29.pdf?MOD=AJPERES>

⁸ Prequin. 2017. Prequin Special Report: Conventional and Renewable Energy. <http://docs.prequin.com/reports/Prequin-Special-Report-Conventional-and-Renewable-Energy-June-2017.pdf>

BRAZIL

Climate Smart Infrastructure

Country Highlights

Populationⁱ	207.7 million
Annual Population Growth Rateⁱⁱⁱ	0.91%
GDP^v	1.8 trillion
GDP Growth	4.2% p.a.
Moody's Credit Rating^{vi}	Ba2
Private Sector Investment Share in Energy Generation	10%
Total Renewable Energy Investments (2012-2016)^{vii}	USD\$55.61 billion

Energy Accessⁱⁱ	99.7%
Total Installed Energy Capacity (GW)^{iv}	154.1 GW
Total Renewable Energy Generation	94,398 GWh
Energy Consumption Growth (p.a)	2%
Expected Installed Energy Capacity Addition (2014-2024)	79 GW
Required Investments for Installed Capacity Additions	USD\$101 billion
% Non- hydro Renewable Energy Investment Share for Installed Capacity Additions	58%

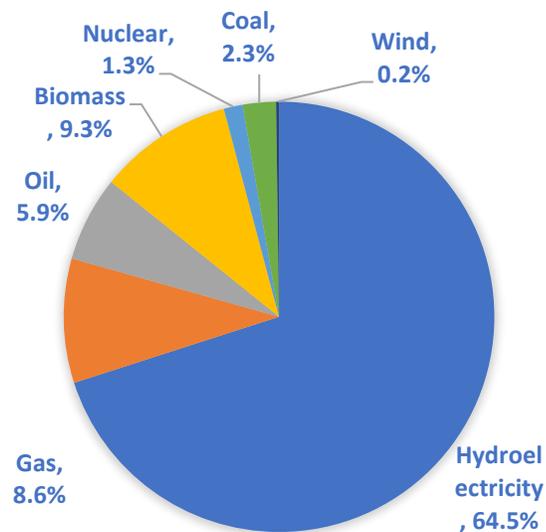
Nationally Determined Contributions (NDCs)^{viii}

Brazil, the world's ninth largest economy, has pledged to reduce greenhouse-gas emissions by 37 % by 2025 from 2005 levels, and by 43 % by 2030. Furthermore, Brazil has set an objective to have renewable energy account for 45% of its energy mix by 2030. In terms of power generation, Brazil targets a non-hydro renewable energy share, including wind, solar and biomass, of 23% by 2030.

Energy Sector Highlights

Installed Capacity by Energy Resource^{ix}

Energy Resource	Number of plants	Installed capacity (MW)	% Total
Hydroelectricity	1259	96,925	64.50%
Gas	156	12,965	8.60%
Oil	2200	8,877	5.90%
Biomass	504	14,001	9.30%
Nuclear	2	1,990	1.30%
Coal	13	3,389	2.30%
Wind	413	10,124	0.20%
Total installed capacity	4,547	148,271	92.10%
Contracted imports		5,850	5.70%
Available power		154,121	



Brazil has the largest power market in Latin America, with a total installed capacity of more than 154 GW. Hydropower has significant potential to expand and remains the predominant source of power generation in Brazil

Installed Capacity Targets for Renewable Energy – Brazil's Energy Expansion Plan (2010–2019)^x

Energy Resource	2010	2019	% Increase
Large Hydroelectricity	83.1	116.7	40%
Small Hydroelectricity	4.0	7.0	75%
Bagasse ¹	5.4	8.5	57%
Wind	1.4	6.0	329%

¹ the dry pulpy residue left after the extraction of juice from sugar cane, used as fuel for electricity generators, etc.

Total	93.9	138.2	
-------	------	-------	--

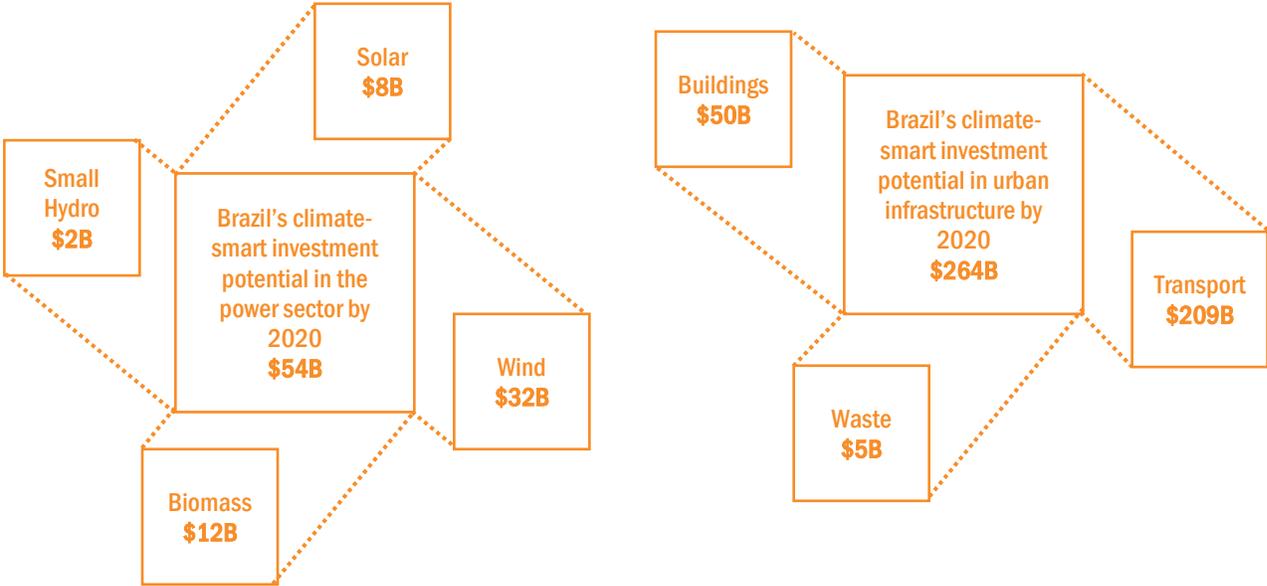
Brazil relies on a high share of renewable energy in its total energy supply. In the medium to long term the

demand for oil is projected to increase, however at a rate well above world average mainly due to: 1) an expected expansion of the transport sector; and 2) the ongoing exploration of the deep-water oil and gas reserves. Future planned installations for wind power outpaces all other sources of energy in the medium to near term, providing an opportunity for Brazil to diversify its existing energy mix to more sustainable and low carbon sources.

Market Highlight: Brazils Climate Smart Investment Trends and Needs^{xi}

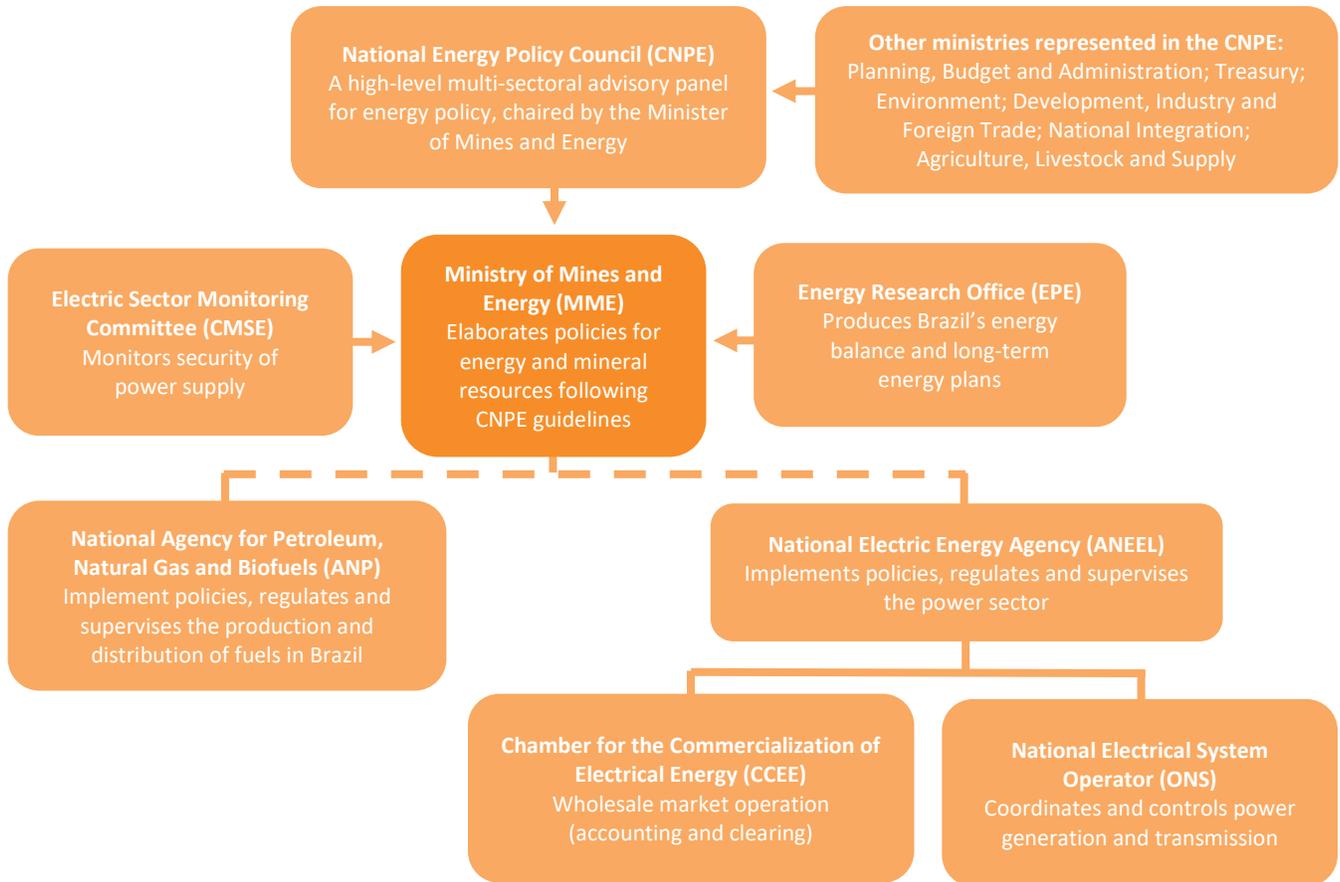
Brazil is one of the top 10 renewable energy markets in the world.

- Brazil’s climate smart infrastructure investment potential in the power generation sector and urban infrastructure sectors by 2020 is \$54 billion and \$264 billion respectively;
- There is heightened demand for Brazil green investment products in clean energy technology; Brazilian labelled green bond market has now reached \$3.67billion;
- Wind power has proven to be the most promising clean energy opportunity. Hydropower has significant potential to expand and remains the predominant source of power generation in Brazil
- Priorities for Brazil to attract more climate smart investments involve the following:
 - Diversify RE investments;
 - Untap energy efficiency;
 - Level the playing field for RE e.g. through support for carbon pricing



Institutions

Institutions that Support the Development of Brazil's Energy Sector



Institutions that Support Private Investments in Public Infrastructure Brazil

Ministry of Planning, Budget and Management (MPOG)	Coordinator of the Steering Committee. In charge of assessing, modeling, and monitoring of potential PPP projects
Ministry of Finance	Provides project appraisal and responsible for monitoring the use of the maximum budget allocated for PPP projects.
Program for Investment Partnerships (PPI)	In charge of coordinating private investment in infrastructure projects, developing and prioritizing the pipeline and overseeing contracts and projects.
Government Auditor General (TCU)	Monitors bidding and awarding of contracts and quality of project supervision.
National Bank for Development (BNDES)	Is responsible for funding and structuring of financial operations and concessional financing - responsible for majority of infrastructure lending to date.
Caixa Econômica Federal (CEF)	The largest 100% government-owned financial institution in Latin America. It is the fourth largest bank in Brazil by assets and one of the largest in Latin America.

Project Highlight: FinBRAZEEC Helps Unlock Private Financing for Urban Energy Efficiency Projects in Brazil

This project creates potential for the market to partially finance a US\$560 million locally denominated, credit enhanced, national street lighting fund for street lighting across Brazilian municipalities. It also helps develop a long run pipeline of standardized PSL transactions working towards replacing lighting in 200 of Brazil’s largest municipalities with each project providing options for direct lending and equity investment.

About the FINBRAZEEC Project

Initiated in 2017, this project aims to unlock private financing for urban energy efficiency projects in Brazil by reducing the credit risk and enhancing the technical quality of Efficient Street Lighting and Industrial Energy Efficiency projects. Currently project preparation is underway and the project will seek board approval end FY18 or early FY19. Caixa is the Financial Intermediary, who will lead a loan syndication and provide credit enhancement mechanisms to attract the private sector.

Highlights

- Largest Green Climate Fund (GCF) loan approved to date;
- First Green Climate Fund (GCF) project in Brazil;
- Excellent example of blending multiple climate finance resources, including GCF (total \$195 million), CTF (\$20 million expected), and Global Infrastructure Facility (GIF, \$0.5 million, potentially another \$4 million under a Project Preparation & Structuring Activity - PPSA);
- Combines existing financing instruments (debt, credit enhancements) to catalyze limited recourse project finance in Brazil for clean infrastructure projects.

Project Value: \$1.325 billion**

\$1.325 b	Project Value**
\$766 m	Loan Syndication
\$25 m	First Loss/liquidity for the Guarantee Fund (GF)
\$200 m	World Bank Investment Project Financing (IPF) to backstop GF
\$330 m	~30% Equity at the sub-project level
\$4 m	GCF Technical assistance
\$0.75 m	WB technical assistance (GIF, ESMAP)

**Note: there are various ways to account the value of this project – for example, the \$200 M IPF loan is not meant to be disbursed, so for some purposes it is not included in the value.

Regulatory Context

1990	Law 8.03 National Program for reducing the role of the state opened the market for private investment through privatizations
1993	Law 8.666 Procurement Law for Public Contracts
1995	Laws 8.987 and 8.074 laws that established the rules for private participation through concessions
1996	Law 9427 creating the National Electric Energy agency (ANEEL)
1998	Law 9648 offers incentives to small hydropower facilities with less than 30 MW of capacity, exempting them from payment of financial compensation for the use of water resources
1998	Regulated Investments in Energy Efficiency. ANEEL made it mandatory for all utilities to invest a minimum of 1% of their net annual sale proceeds in energy efficiency and R&D programs.
2001	Law 10.295 Energy Efficiency Law guarantees the legal mandate for public agencies and methods to devise the minimum energy efficiency standards for equipment, vehicles, and buildings.
2005	Federal Law 11907 specified biodiesel as a new fuel in Brazil's energy market. By January 2008, the law called for the blending of a 2% biodiesel, known as B2, with diesel oil
2008	Brazil National Climate Change Plan focuses on 7 areas including Low carbon development, renewable power, biofuels. Part of its aim is to ensure that renewable energy continues to account for a substantial share of the energy market
2008	National Energy Efficiency Policy aims to increase energy efficiency across various sectors, with the help of goals/policies to be implemented until 2030
2010	10 Year Energy Expansion Plan 2010-2019 implements the phasing out of fossil fuel power plant construction by 2014 and foresees major expansions in the hydro and wind grid-connected power sectors through 2024. Includes new targets for 7 GW of utility -scale solar power and 1.3 GW of distributed solar PV capacity to be installed by 2024
2012	Resolution 482 of ANEEL entered into force introducing net metering policy in Brazil for small scale renewable generators
2014	Executive Decree 656 exempts manufacturers from paying the Social Integration Program and Contribution to Social Security Financing (COFINS) tax on components purchased for wind turbines production
2015	Resolution 687 of ANEEL expands solar power capacity on a greater scale without relying on the national grid

ⁱ The World Bank

ⁱⁱ SE4ALL Global Tracking Framework. Data as of 2016 estimate

ⁱⁱⁱ UN. 2015. <https://esa.un.org/unpd/wpp/Download/Standard/Population/>

^{iv} Ministry of Mines & Energy 2016. Please note, IFC has cited >140GW (2015)

^v The World Bank

^{vi} Moody's. <https://www.moody's.com/credit-ratings/India-Government-of-credit-rating-401565>

^{vii} Climatescope. Brazil. <http://global-climatescope.org/en/country/brazil/#/enabling-framework>

^{viii} Climate Action Tracker (CAT). <http://climateactiontracker.org/countries/brazil.html>. IFC. 2016. Climate Investment Opportunities in Emerging Markets.

^{ix} Ministry of Energy & Mines 2016

^x Arena. 2017. Global Data. Brazil Renewable Energy Policy Handbook 2017. <http://www.arena-international.com/Uploads/2017/11/27/r/c/j/Free-Brazil-Renewable-Energy-Policy-Handbook-2017.pdf>

^{xi} IFC. 2016. Climate Investment Opportunities In Emerging Markets. P 39. BNDES. 9/14/2017. Article: International award places BNDES green bonds among the top 3 in Latin America. https://www.bndes.gov.br/SiteBNDES/bndes/bndes_en/Institucional/Press/Noticias/2017/20170914-international-award-green-bonds.html. Climate Bonds Initiative. 2017. State of the Market: Brazil Edition. https://www.climatebonds.net/files/files/Media%20Release_SOTM_BrazilEdition_EN_London_041017.pdf



AN INITIATIVE OF



WORLD BANK GROUP



GIF 2018

ADVISORY COUNCIL MEETING

PANEL

Renewable Energy Programs: India, Egypt and the Common Risk Management Mechanism (CRMM)

Moderator: Rohit Khanna, Practice Manager, World Bank

APRIL 18, 2018

OVERVIEW

Accelerating the global clean energy transformation requires a deliberate approach to scaling up renewable energy investment by EMDE Governments. The largest investment need includes most of Sub-Saharan Africa and many countries in Asia and Latin America; all with excellent renewables resources and some of the fastest growing demands for energy. Many Governments are taking the lead on climate action and making decisive steps toward developing bankable project pipelines, diversifying and blending sources of project financing, and exploring diverse options for credit enhancements. Increasing efforts to directly address the perceived and actual risks that often constrain solar energy market formation will be critical to crowding in the green financing needed for scale-up at the national level. Global platforms such as the Common Risk Mitigation Mechanism (CRMM) are emerging to enhance collaboration on addressing the issue of project risk and mobilization through standardized project preparation, and standardized credit enhancement instruments all aimed at increasing solar energy power development around the world.

Sources of Investment and Investment Trends in Renewable and Solar Energy

As it stands, debt makes up most of the investment in utility-scale renewable energy projects, both at the project level in the form of non-recourse loans, bonds or leasing; and at the corporate level in the form of borrowings by the utility or project developer. In 2016, commercial banks led in the provision of project level debt for renewable energy projects, followed by green bond issues that doubled globally to USD 95.1 billion in 2016²². National and Multilateral Bank borrowing, was also a major source of debt for renewable energy power assets, with Development Banks such as ADB approving USD 3.7 billion in climate finance investments to its developing member countries in this year.

For the 5th consecutive year, investment in new renewable power capacity (including all hydropower) was USD 249.8 billion and almost double the investment in fossil fuel generating capacity²³. According to REN21 2017 Global Status Report on Renewable Energy, asset finance of utility-scale projects, such as wind farms and solar parks, dominated investment in 2016, at USD 187.1 billion. Furthermore, newly installed renewable power capacity set new records in 2016, with 161 gigawatts added, increasing the global total by almost 9%. Solar PV lead the way, accounting for 47% of total additions, followed by wind at 34%, and hydro power at 15.5%.

Bloomberg New Energy Finance projects that approximately \$10.2 trillion will be invested in new power generation capacity worldwide to 2040. Of this, 72% will be in renewable energy, or \$7.4 trillion (Solar powered generation \$2.8 trillion – or an average 2.3% investment increase per year - and wind \$3.3 trillion – or an average 3.4% investment increase per year)²⁴. Power generation from these 2 sources alone are expected to make up 48% of world's installed capacity and 34% of electricity generation by 2040, compared to 12% and 5% today.

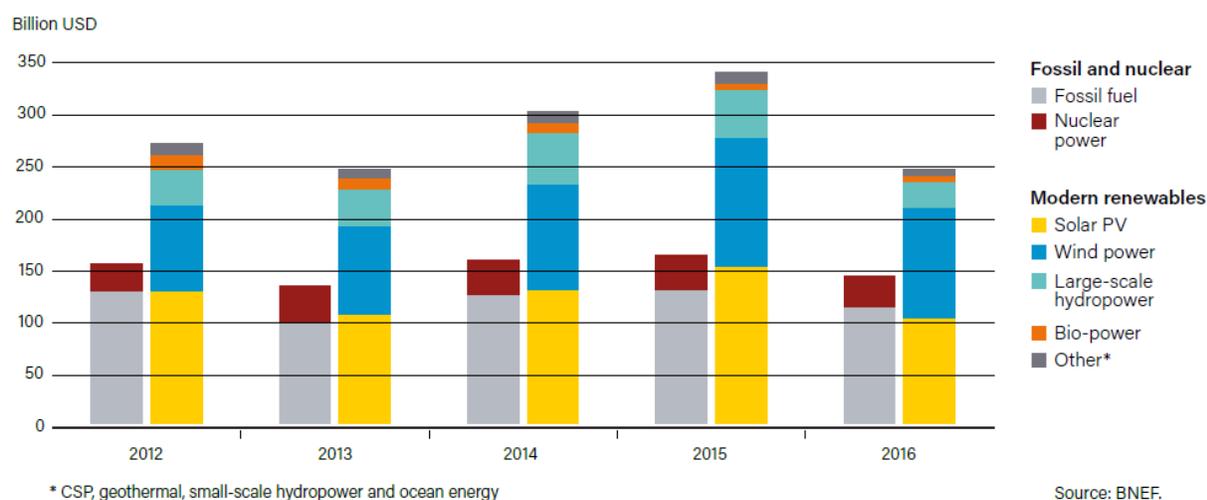
The levelized cost of solar-generated electricity is projected to drop another 66% by 2040 and is increasingly cost-competitive with traditional power sources. Large scale solar PV is today outcompeting new fossil fuel projects, especially in regions with low cost financing. As more markets use tendering over feed-in-policies to increase their installed capacity, new record low bids are being set using auction-based procurement - the latest round of solar auctions in Mexico yielded an unheard-of average price of US\$20.57 per MWh, including a \$17.70 per MWh bid. Under these conditions, the outlook for further influx of investment finance in the solar industry, alongside the sweeping improvements to access to affordable and clean energy is promising.

²² UNEP-Frankfurt School. 2017. Global Trends in Renewable Energy Investment 2017.

²³ BNEF. 2017. New Energy Outlook.

²⁴ BNEF. 2017. New Energy Outlook.

Figure 1: Global Investment in Power Capacity by Type (2012-2016)



Suggested Policy Enhancements for the Scale-up of Renewable and Solar Energy

According to the IEA, a set of modified policy changes in EMDEs for national renewable energy programs to capitalize on the investment would need to include²⁵:

1. More certainty over credible implementation of ambitious long-term policy frameworks in some markets (e.g India);
2. Greater measures to reduce regulatory barriers and improve the system and grid integration variables (e.g. China, South Africa), particularly distributed Solar PV;
3. Improved market access and strengthened financial sustainability in power sector, for example through the removal of fossil fuel subsidies;
4. Improved financing conditions with greater stakeholder consultation during policy design, development institution participation to reduce off-taker risk and concessional financing.

The Common Risk Mitigation Mechanism (CRMM)

Successful case studies in financing renewable energy projects have highlighted the need for a focus on risk mitigation and blended finance to scale up needed investment in this sector. The CRMM is a multilateral market platform and innovative financing mechanism designed to leverage billions of capital to catalyze USD 1 trillion of domestic and international private institutional capital, and over 1TW of solar power generation capacity by 2030 in low and middle-income countries.

The CRMM - proposed launch in December 2018 – is supported by the International Solar Alliance (ISA), and aims to de-risk and reduce the cost of capital for developing renewable energy projects in its member countries²⁶. This platform is intended to:

²⁵ IEA. 2016. Renewable Energy Medium Term Market Report. <http://www.iea.org/publications/freepublications/publication/MTRMR2016.pdf>

²⁶ ISA is an alliance of 121 countries, located totally or partially between the tropics, and led by the Governments of India and France, launched during COP21 ISA aims at increasing the solar electricity production. As of Dec 2017, ISA is considered a treaty-based International Organization with 46 countries signing and 19 countries ratifying the framework agreement of ISA as of December 2017.

- Act as a pooled insurance mechanism with limited liability to which Banks and multi-lateral institutions can contribute to the fund for a marginal premium;
- Model aggregate risk and standardize the development and scale up of financing of solar projects across various investor bases;
- De-risk portfolios of utility scale assets to encourage the participation of the capital markets and institutional investors;
- Advise governments on how to overcome current bottlenecks and open a new practical pathway to financing solar power generation at scale.

The CRMM is driven by governments of seventeen countries with strong solar potential, namely, Argentina, Australia, Brazil, Burkina Faso, Cameroon, Ivory Coast, India, France, Mali, Namibia, Niger, Nigeria, Senegal, Seychelles, Chad and Yemen. Eventually, the CRMM aims to support globally other clean technologies and infrastructure investments.

Specific objectives of the CRMM are to:

1. Further develop the concept of the feasibility to create guarantee mechanisms both globally and at regional levels;
2. Create a secure environment for affordable private institutional investment in solar assets;
3. Operate as a platform to aggregate, structure and channel key risks to existing guarantee mechanisms, in a cost-efficient manner;
4. Underwrite key risks, namely off-takers' default, FX and currency inconvertibility risks;
5. Distribute through a partners' network, a user-friendly, product designed to make complex mitigation instruments universally accessible for solar energy assets;
6. Maximize the impact of Public investment; provide its service at affordable prices;
7. Raise projects to international investment grades to attract private capital;
8. Facilitate and accelerate the dissemination of higher quality standards and international best practices.

Funding the CRMM

With the support of the World Bank Group, the CRMM aims to raise another \$350 million through the Green Climate Fund and \$250 million from private investors. A \$300-million India-French fund, like the India-UK Fund, is also being assessed²⁷.

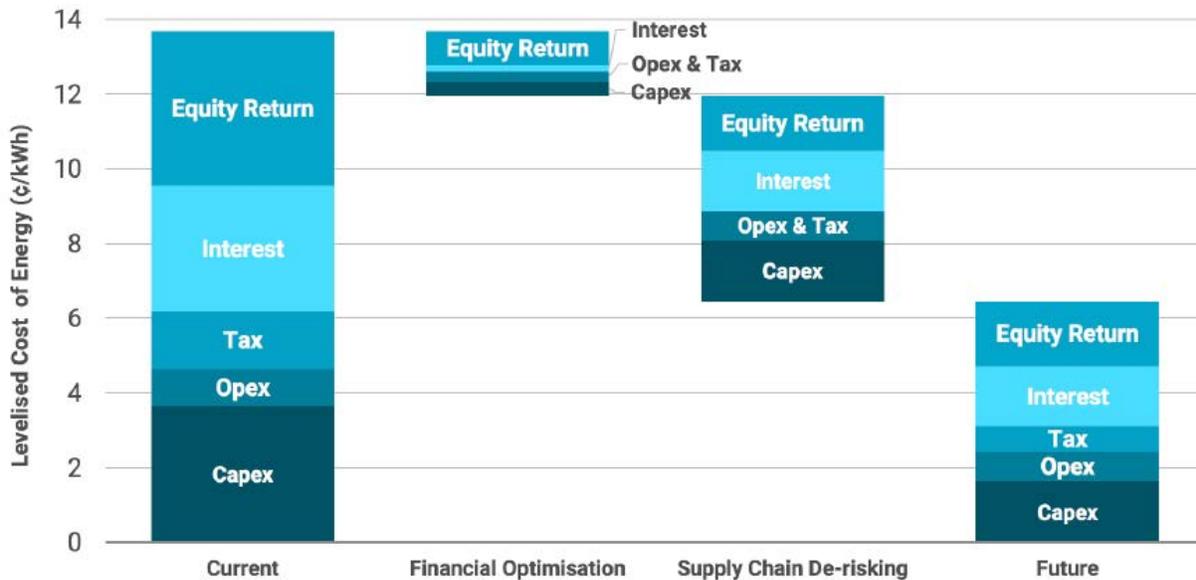
The GIF is currently exploring ways to help the CRMM in the development of future solar project preparation and pipeline support and other areas of collaboration.

²⁷ Based on publicly available information only. As at Dec 11 2017. <https://www.thehindubusinessline.com/news/isas-riskmitigation-mechanism-to-be-in-place-by-december-2018/article9989548.ece>

Spotlight: Potential Impact of a CRMM

As Figure 1 shows, having improved access to risk-management products and a better understanding of risks and the costs of their mitigation will allow for more efficient bidding and reduced financing margins. Higher investment volumes will result in a more competitive environment among technology suppliers and along the entire logistical chain, which will further benefit final consumers.

Figure 1 - Tariff Impact of Risk Mitigation²⁸



Snapshot of GIF Solar PV Portfolio Activities

This fiscal year, GIF is engaged in two (2)²⁹ pioneering solar energy activities in Afghanistan and Vietnam, with a funding total of approximately USD 1.2 million. These activities leverage technical partners from The World Bank, IFC, IDB and other ODA entities, and together represent an investment total of USD 1.05 billion.

²⁸ CRMM Feasibility Study. Nov 2017.

²⁹ 1 approved project preparation & structuring activity, 1 approved project definition activity

Figure 2: GIF FY 18 Solar Activities

COUNTRY: Project Name	Description
AFGHANISTAN: Naghlu Solar Project	Assist the Government of Afghanistan with transaction structuring and support necessary to attract private sector participation in developing and operating a Solar PV plant in Naghlu area in Afghanistan. GIF will provide the financial, coordination and technical support resources necessary to this first Solar independent power producer (IPP) project, to set standard template procurement and legal documents in the local context.
VIETNAM: Pilot Solar Auction	Support Vietnam’s Ministry of Investment and Trade (MOIT) to design the first solar auction program to achieve target set in Vietnam’s Revised National Power Development Plan 7 of attaining 20 GW of solar generation by 2030. GIF support includes the improvement and standardization of relevant project documents (including power purchase agreement) to ensure the successful implementation of the pilot phase of the solar program (e.g. 500 MW by 2020) and largescale replicability to attain the longer term 20 GW target.

INDIA

Renewable Energy Infrastructure

Country and Energy Sector Highlightsⁱ

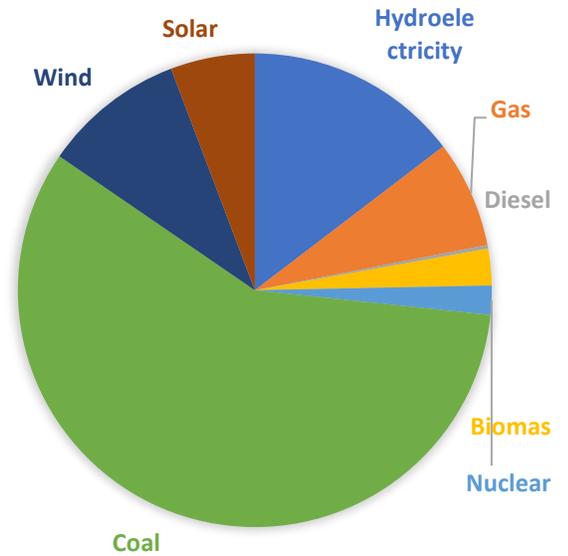
Populationⁱⁱ	1.324 billion
Annual Population Growth Rate^{iv}	1.26%
GDP^{vi}	2.264 trillion
Moody's Credit Rating^{viii}	Baa2
Private Sector Investment Share in Energy Generation	44%
Prevailing Renewable Energy Contract Types	Feed-In/Fixed Tariff Regime, Competitive Bidding/Auction Framework
Investment need to achieve 175 GW (2022)	\$189 billion - \$57billion equity, \$132 billion debt ^{xi}

Energy Accessⁱⁱⁱ	79%
Lowest recorded solar auction tariff rate^v	Rs 2.43/kWh (₹3.8/kWh)
Energy Consumption Growth (p.a)^{vii}	4.2%
Total Installed Energy Capacity (GW)^{ix}	340 GW
Total Installed Solar PV Capacity (2018)^x	19.5 GW
Installed Solar PV Capacity Target (2022)	100 GW
Installed Renewable Energy Capacity Target incl. Solar PV (2022)	175 GW

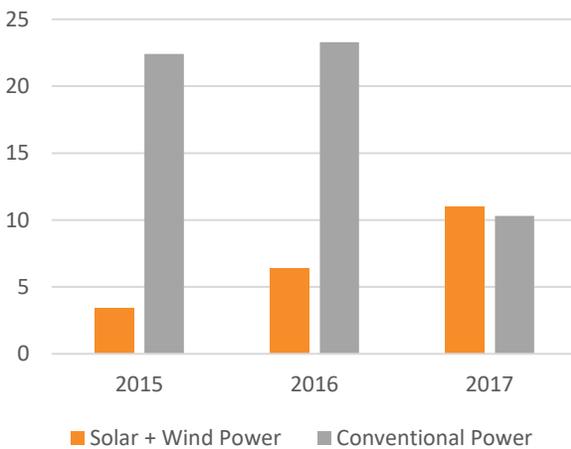
Energy Sector Highlights

Installed Capacity by Energy Resource (2018)^{xii}

Energy Resource	Installed capacity (MW)	% Total
Hydroelectricity	49,770	14.62%
Gas	24,897	7.31%
Diesel	838	0.25%
Biomass	8,528	2.50%
Nuclear	6,780	1.99%
Coal	197,172	57.90%
Wind	32,957	9.68%
Solar	19,584	5.75%
Total installed capacity	340,526	



India Total Net Capacity Addition (GW)



Installed Capacity Targets for Renewable Energy (GW)^{xiii}

Energy Resource	2016	2022	% Increase
Small Hydroelectricity	4.4	5	14%
Biomass	8.3	10	21%
Wind	32.7	60	83%
Solar	15.6	100	542%
Total	61.0	175	

India's Clean Energy Achievements^{xiv}

World's Largest Renewable Energy Expansion Program – 175 GW by 2022;

National Solar-Wind Hybrid Policy Drafted – promotes large grid connected wind-solar PV system, better grid stability, optimal utilization of transmission infrastructure;

SOLAR PV

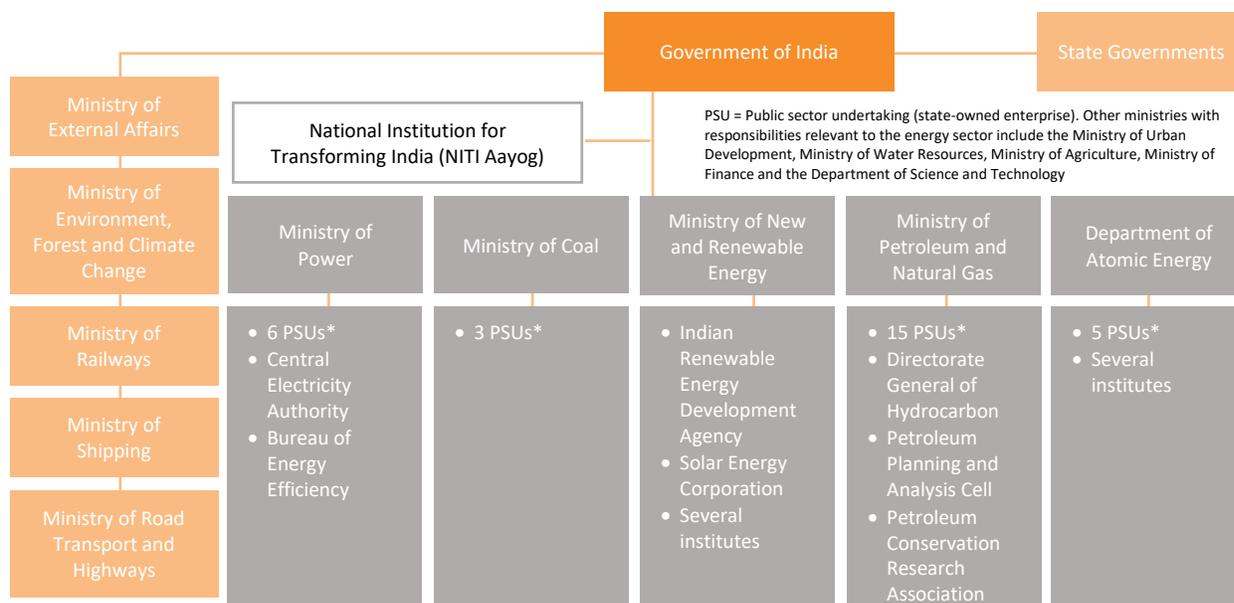
- Solar capacity increased 370% in the last 3 years;
- Record low tariff achieved of Rs2.44 Kwh (€3.8/kWh) in Bhadla, Rajasthan;
- Installed capacity of solar rooftops increased 15 times from 41 MW in 2014-2015 to 656 MW in 2016-2017;
- Currently the world's largest ground based solar plant and rooftop solar plant;
- Reduction of solar power tariff by >75% using "plug and play" solar park model scheme. Solar park scheme doubled from 20GW to 40 GW;
- Solar Power development made attractive with India's National Thermal Power Corporation (NTPC) and Solar Energy Corporation of India (SECI) taking offtake risk, and dedicated green corridors to transmit renewable energy;
- New standardized, internationally recognized bidding guidelines drafted to increase competition and reduce risks.

WIND

- Highest ever wind capacity addition of 5.5 GW in 2016-2017;
- 17% reduction in wind power cost by moving from fixed tariff regime to competitive bidding framework;
- Record wind tariff Rs3.46/kwh.

Institutions

Central Government Institutions that Support the Development of India's Renewable Energy Sector Infrastructure^{xv}



Program Highlight: REWA Solar Project Demonstrates Commercial Viability of Large Scale Solar in India

About the REWA Solar Project

The 750 MW Rewa solar project was the first project supported under India's Shared Infrastructure for Solar Parks Program. This program seeks to increase solar generation capacity through the establishment of utility-scale solar parks in India by setting up solar parks initially in four states – Karnataka (2000MW), Madhya Pradesh (750MW), Andhra Pradesh and Telangana; and will contribute directly to the achievement of Government of India's target of installing 100GW solar power by 2022.

World Bank financed the evacuation with a ~\$35 million loan with private financing of \$575 million for the solar power plant within the solar park. IFC's Investment team provided the entire debt package of \$437 million (A loans of \$128 million and mobilization of \$309 million). The robust structuring of the project enabled one of the highest mobilizations in India - USD 2.4 through commercial lenders for every USD 1 loan provided by IFC on its own balance sheet. Further the loan was for 20 years – a first in India.

The project represents many firsts which are instrumental in “creating new markets” in renewables in India:

- It is the largest solar power project in the country at a single site demonstrating commercial viability of such large-scale projects.
- It introduced many first-time features, including guaranteed energy offtake, termination compensation, payment security mechanisms, unique bidding guidelines and other features in line with the international best practices.
- It helped create a market of open-access institutional offtakers (a part of the electricity generated will be sold to Delhi Metro Rail Corporation) alongside utilities thereby operationalizing inter-state open-access for solar power in India.
- It is the first project in India's history wherein the associated renewable energy tariff breached tariff from the other conventional sources. The project registered a record low tariff of about USD cents 4.4/ unit, which is a tipping point for grid parity of solar tariffs in India.

Expected post-tender results:

- Mobilization of about \$575 million private sector investment in a Low-Income State.
- Reduced GHG emissions by 1 million tons per year.
- India achieved grid parity: with solar tariff equivalent to new coal power plants, the project is a potential point of inflexion in India's solar program, with fundamental change in market expectations of tariff.
- Renewable energy project agreements affirmed as internationally bankable for the first time in India, enabling low cost and longer tenor financing.
- Replication potential: Ministry of New & Renewable Energy adopted several structuring features in the national solar bidding guidelines. IFC was mandated for a replication project of 1050 MW.
- Inter-state open access provisions of Electricity Act 2003 operationalized for solar power.

Regulatory Context

1998	Electricity Regulatory Commissions Act mandated the creation of the Central Electricity Regulatory Commission (CERC), to which was delegated the task of setting the tariff of centrally owned or controlled generation companies.
2001	Energy Conservation Act established the Bureau of Energy Efficiency (BEE). BEE was constituted to reduce the 'energy intensity' of the Indian economy.
2003	India Electricity Act provides for regulatory interventions for promotion of renewable energy (RE) sources through a) determination of tariff; b) specifying renewable purchase obligation (RPO); c) facilitating grid connectivity; and d) promotion of development of market.
2005	National Electricity Policy consolidates the laws related to generation, transmission, distribution, trading and use of electricity
2006	National Tariff Policy (NTP) requires the State Electricity Regulatory Commissions (SERCs) to fix a minimum percentage of Renewable Purchase Obligation (RPO)
2011	Amended-National Tariff Policy (NTP) prescribed solar-specific RPO be increased from a minimum of 0.25 per cent in 2012 to 3 per cent by 2022
2016	Draft Electricity Plan further considers demand/supply of electricity by focusing on energy efficiency, conservation, and demand-side management (DSM)

ⁱ Data estimates may vary depending on source

ⁱⁱ The World Bank

ⁱⁱⁱ SE4ALL Global Tracking Framework. Data as of 2016 estimate

^{iv} UN. 2015. <https://esa.un.org/unpd/wpp/Download/Standard/Population/>

^v Bhadla, Rajasthan

^{vi} The World Bank

^{vii} BP. Energy Outlook. India. <https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/energy-outlook/bp-energy-outlook-2018-country-insight-india.pdf>

^{viii} Moody's. <https://www.moodys.com/credit-ratings/India-Government-of-credit-rating-401565>

^{ix} CEA. 2018. http://www.cea.nic.in/reports/monthly/installedcapacity/2018/installed_capacity-03.pdf, IFC data 8GW (2017)

^x total installed grid-connected solar capacity. CEA. 2018. http://www.cea.nic.in/reports/monthly/installedcapacity/2018/installed_capacity-03.pdf

^{xi} Climate Policy Initiative (CPI). 2016. Reaching India's Renewable Energy Targets: The Role of Institutional Investors. https://climatepolicyinitiative.org/wp-content/uploads/2016/11/Reaching-Indias-Renewable-Energy-Targets-The-Role-of-Institutional-Investors_conference-draft.pdf

^{xii} CEA. 2018. http://www.cea.nic.in/reports/monthly/installedcapacity/2018/installed_capacity-03.pdf

^{xiii} India Ministry of New & Renewable Energy. 2018. <https://mnre.gov.in/physical-progress-achievements>

^{xiv} May 2017. MNE. Clean Energy Achievements and Initiatives. <https://mnre.gov.in/sites/default/files/uploads/Ujjwal-Bharat-3-Year-Brochure-English.pdf>

^{xv} Brookings. 2016. India Energy Climate Policy.

https://www.brookings.edu/wpcontent/uploads/2016/07/india_energy_climate_policy_ebinger.pdf

750MW REWA ULTRA MEGA SOLAR PROJECT

Manu Srivastava, Principal Secretary, New & Renewable Energy Department, Government of Madhya Pradesh, India

Rewa Project is a 750 MW Solar Power Plant being developed in Rewa in Madhya Pradesh, India. In India, development of large scale solar power projects had so far been the initiative of federal government Companies (CPSUs), with the role of states being only to develop solar park infrastructure. Rewa Ultra Mega Solar Limited (RUMSL), a state entity created in July 2015, undertook the entire gamut of activities for development of an Ultra-mega Solar Power Project; this included conceptualization, market consultations, financial and legal structuring and bid process management, as also development of land and associated infrastructure.

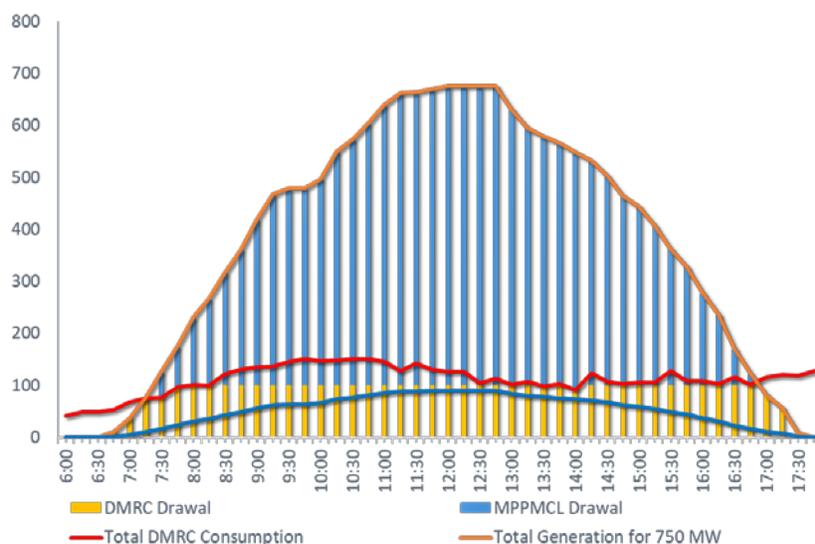
The outstanding initiative of RUMSL has enabled several innovations that proved to be a potential tipping point for solar power. The 750 MW Rewa Ultra Mega Solar Project has achieved historic results, with a record low first year tariff of 4.5 cents/kWh of electricity and a levelized tariff of 5 cents/kWh over the term of twenty-five years. Rewa was the first project in India to break the grid parity barrier, that too without any viability gap funding.

The bidding process achieved unprecedented market response with twenty bids totalling to 7500 MW being offered by developers– an unprecedented offer of ten times the project capacity. International bidders, such as Softbank (Japan), Engie (France), Enel (Italy), Canadian Solar, Solenergi (backed by pension funds), Sembcorp (Singapore), participated for the first time in State bids. The transaction advisor IFC managed the entire process in a manner, that both foreign and Indian companies developed confidence in the Project.

For the first time in India, a solar power project has been designed to supply power to an inter-state Open Access Consumer – Delhi Metro Railway Corporation (DMRC) will get about 24% of the energy from the Project. DMRC is in Northern Region, while the project is located in Western Region, using the inter-regional corridor for flow of power.

RUMSL implemented energy contract (first in India), rather than pro rata power contracts in vogue in India. This allowed the project to fulfil the power requirement profile of both Madhya Pradesh and Delhi Metro (DMRC). This was accomplished through an optimum scheduling arrangement developed through first principles. DMRC would be shifting approximately 90% of its day demand to solar power (Fig 1).

Fig 1: Time block wise Optimum Scheduling explained for a day

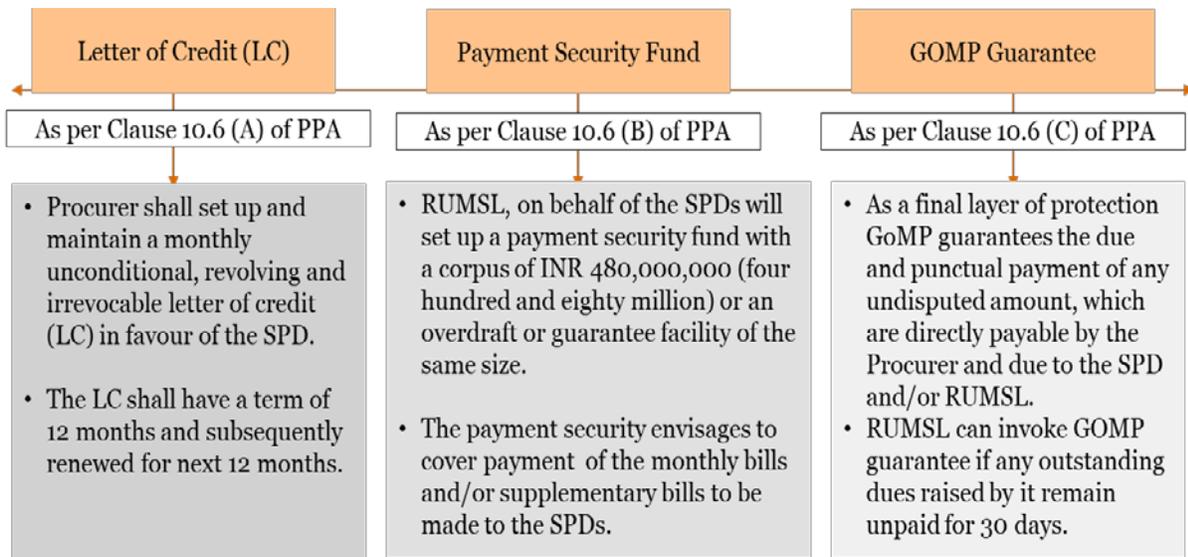


Innovations to allow equitable distribution of risk

Several features of the Rewa project have been designed to achieve an optimal distribution of risks between Procurers, SPDs (Solar Project Developers) and the Solar Power Park Developer (SPPD), which led to securing better tariffs for Rewa. Some of the key features include diverse category of consumers offtaking power from the project resulting in strengthening of bankability of the PPA, energy contract tailored to meet the consumer demand patterns thus minimizing the supply offtake risk, lowering of infrastructure charges through use of low cost funding available under the Clean Technology Fund, etc.

The carefully managed transaction process was also critical in evaluating and addressing the project development risks. The pre-bid meetings were taken very seriously. Comments on transaction structure and all project documents from bidders were studied, and large number of changes was made in the documents on the basis of the same. RUMSL held discussions even with the lenders of the bidders, depending upon the initiative taken by them, so as to convince the lenders of the strengths of the project.

A three tiered payment security mechanism significantly aided to the bankability of the power purchase agreements. The details of the mechanism are outlined below:



RUMSL has finalized the Payment Security Fund with Indian Renewable Energy Development Agency (IREDA). In addition to being a Payment Security Mechanism, the PPA has the option wherein RUMSL, on behalf of the procurer, can also pay to the developer Monthly Bills/Supplementary Bills at the request of the procurer. This facility allows Procurers access to the early payment rebate facility.

The combined effect of all these helped the REWA project achieve one of the lowest tariffs in India. The Project has been acknowledged as a model project by Government of India. Many of its features have been included in the Standard Bidding Guidelines for solar projects of Government of India.

EGYPT

Renewable Energy Infrastructure

Country and Sector Highlights

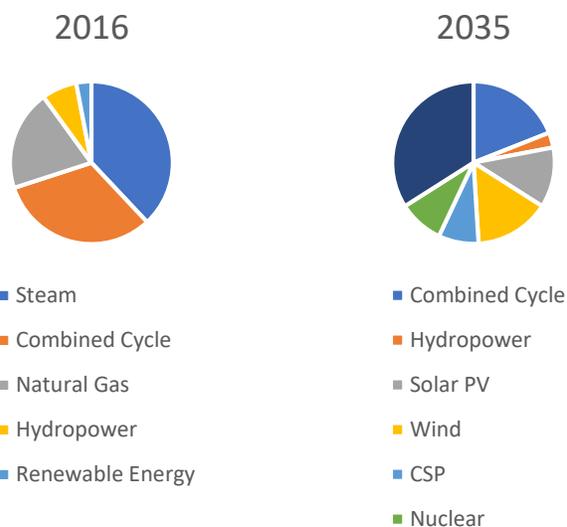
Populationⁱ	95.69 million
Annual Population Growth Rate	2.18%
GDPⁱⁱⁱ	356.3 billion
Moody's Credit Rating^v	B3
Total Clean Energy Investments (2012-2016)^{vii}	\$1.08 billion
Prevailing Renewable Energy Contract Type(s)/Mechanism(s)^{ix}	Feed-In/Fixed Tariff, Competitive Bidding, Build Own Operate (government announced its plan to switch to auctions from 2018)
Installed Renewable Energy Capacity Target incl. Solar PV (2018-2030)	25 GW

Energy Accessⁱⁱ	99.8%
Average retail electricity price	\$70.03 USD/MWh
Total Installed Energy Capacity (2016)^{iv}	45.1 GW
Total Planned Installed Energy Capacity Increase (2018-2030)^{vi}	52 GW
Total Installed Renewable Energy Capacity^{viii}	900 MW
Total Installed Solar PV Capacity (2016)^x	~80 MW

Energy Sector Highlights

Egypt's Electricity Generation Mix (%) - Renewable Energy Plan^{xi}

Energy Source	2016	2035*
Steam	38%	
Combined Cycle	32%	19%
Natural Gas	20%	
Hydropower	7%	3%
Renewable Energy	3%	
Solar PV		12%
Wind		15%
CSP		8%
Nuclear		9%
Coal-fired		34%

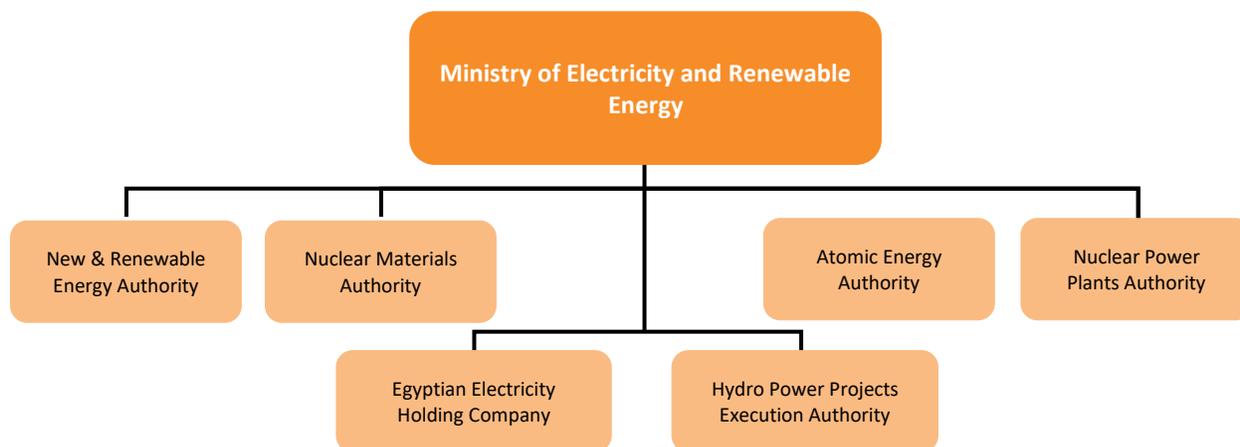


Egypt's Renewable Energy Achievements^{xii}

- In 2008, Egypt adopted a New & Renewable Energy Strategy that aims to increase the share of generated energy from renewable energy to 20% by 2022 – 12% wind, 6% hydropower, 2% solar;
- As of October 2017, a total of 27 solar projects reached financial close under Egypt's Feed-in-Tariff Program, attracting \$1.8 billion of investment. (Mostly EBRD, WB, IFC).
- Gradual market liberalization through a new electricity law (2015) will allow the offtaker to have more autonomy by becoming an independent transmission system operator;
- Investment of \$745m in new wind infrastructure in 2016, compared with zero renewable energy investment in the previous year on record;
- Burgeoning local investor community making up 16% of total investment in the sector between 2010-2016.

Institutions

Central Government Institutions that Support the Development of Egypt's Renewable Energy Sector Infrastructure



Program Highlight: Egypt's Feed-in-Tariff Round 2 expected to be one of the largest foreign direct investments (FDIs) in Egypt in years

Thirty (30) solar projects achieved financial close in late 2017 as part of the second round of Egypt's landmark Solar Feed-in-Tariff Program. This program aims to mobilize private investment to develop up to 4,300 MW of new generation power (solar 2,300 MW and wind 2,000MW). The thirty solar PV plants that make up the Benban Solar park, will have total capacity of 1.5 GW, and when commissioned by end-2019 in the south of Egypt, will be the largest solar installation in the world.

Phase 2 included projects financed by institutions such as the European Bank for Reconstruction and Development (EBRD), the World Bank Group (WBG), and Proparco, and is expected to be one of the largest foreign direct investments (FDIs) in Egypt in years, catalyzing a total investment inflow of \$2 billion. The success of this Round of the program will help introduce multiple regional and international investors to the country, as well as many new lenders, highlighting Egypt's re-emergence as an attractive investment destination. It will also help deliver on a key priority for Egypt's government - to meet its national target of 20% renewable energy generation by 2022.

The Government of Egypt (GoE) wants to leverage the investor interest following the successful FiT Round 2 to establish a transparent auction process to get low tariff and the most optimal risk allocation to make renewable energy affordable on a sustainable basis. If successful, the auction process could replace the FiT program as the mechanism for procurement of renewable energy.

Regulatory Context^{xiii}

1971	Constitution / Article 32 states goal to get optimum benefits from renewable energy, promote its investments, and encourage R&D, in addition to local manufacturing.
1981	Companies Law No. 159 establishes the requirements for incorporation of an SPV and the general rules for its management
1986	Law No. 102 establishes the New and Renewable Energy Authority, NREA. NREA has the primary role in promoting and developing renewable energy in Egypt
1994	Law 4 for the Protection of the Environment formulates the general policies for protecting and promoting the environment
1997	Presidential Decree No. 326 establishes the Electric Utility and Consumer Protection Regulatory Agency, affiliate of the Ministry of Electricity and Renewable Energy, responsible of the issuance of permits and licenses for generation, transmission and distribution
1997	Investment Law No. 8 on Investment Guarantees and Investments
2014	Cabinet Decree No. 1947 on Feed-in Tariff -1st Round establishes the basis for Feed-in Tariff for energy produced from renewable energy projects and encourage investment in renewable energy.
2014	Law No. 203 incentivizes the production of Electricity from Renewable Energy Sources. Local distribution companies obliged to connect a RE projects to the grid
2015	Prime Ministerial Decree No. (37/4/15/14) regulations to avail land for renewable energy Projects.
2015	Electricity reform law No. 87, gradual market liberalization of the electricity sector in Egypt. Removes the state's monopoly over the energy sector and creates two parallel markets: a regulated one for retail customers and a competitive market that private investors can use for local distribution networks to sell at negotiated prices.
2016	Prime Ministerial Decree No. (2532) on Feed-in Tariff-2nd Round establishes regulations to Avail Land for renewable Energy Projects

ⁱ The World Bank

ⁱⁱ The World Bank

ⁱⁱⁱ The World Bank

^{iv} Ministry of Electricity and Renewable Energy. Egyptian Renewable Energy Plan. http://auptde.org/Article_Files/Egypt.pdf

^v Moody's. <https://www.moody.com/credit-ratings/Egypt-Government-of-credit-rating-258330>

^{vi} Climatescope. <http://global-climatescope.org/en/country/egypt/#/enabling-framework>

^{vii} Climatescope. <http://global-climatescope.org/en/country/egypt/#/enabling-framework>

^{viii} 2% of Total Installed Energy Capacity. Climatescope.

^{ix} Climatescope. Egypt Renewable Energy Feed-in Tariff by Tender. <http://global-climatescope.org/en/policies/#/policy/4386>

^{*} Approximate. CSP not incl.= 140MW, Ministry of Electricity and Renewable Energy. Egyptian Renewable Energy Plan.

http://auptde.org/Article_Files/Egypt.pdf

^{xi} Ministry of Electricity and Renewable Energy. Egyptian Renewable Energy Plan. http://auptde.org/Article_Files/Egypt.pdf AND <http://www.ieta.org/resources/COP%2023/Side-Event-Presentations/2.1%20Renewable%20Energy%20in%20Egypt%202-11-2016.pdf>

^{xii} Ministry of Electricity and Renewable Energy. Egyptian Renewable Energy Plan. http://auptde.org/Article_Files/Egypt.pdf

^{xiii} Ministry of Electricity and Renewable Energy. Egyptian Renewable Energy Plan. http://auptde.org/Article_Files/Egypt.pdf

Establishment of the Common Risk Mitigation Mechanism

Proposition: Solar project insurance scheme for 121 ISA Countries

Risks insured

- i. Offtaker risk
 - a. Delay in payment beyond specified period (60 days)
 - b. Default in payment
- ii. Foreign exchange risk
- iii. Political risk

Need

In keeping with its Affordable Finance at Scale Programme, ISA member countries could benefit from such a mechanism to:

- i. Access finance, which is currently not forthcoming for solar projects in many member countries due to high risk profile of projects, as well as high transaction cost
- ii. Reduce the cost of capital as the risks of projects get covered, as well as get access to risk insurance at more affordable prices due to the competition between insurers
- iii. Create deep markets by leveraging public money, which if used to underwrite risks can lower the cost of private finance, and the quantity of capital accessible increases.

Current status

On 18 May 2017, the governments of Argentina, Australia, Brazil, Burkina Faso, Cameroon, Chad, France, India, Ivory Coast, Mali, Namibia, Niger, Nigeria, Senegal, Seychelles, Uganda and Yemen entrusted an international multi-stakeholder taskforce with the mission to define and structure a common mechanism aimed at de-risking investments in solar. The task force consisted of the Council on Energy, Environment and Water (CEEW), the Currency Exchange Fund (TCX), the Terrawatt Initiative, and the Confederation of Indian Industry (CII). The study is based on extensive consultations of relevant stakeholders in New Delhi, Abu Dhabi, Paris, New York, Buenos Aires, etc. The range of stakeholders included solar developers, private capital markets, insurers and re-insurers, DFIs etc.

Based on this study, the Common Risk Mitigation Mechanism was formally announced as a priority action item for the ISA at the ISA Founding Conference in New Delhi on 11 March 2018. The French President, Emmanuel Macron, called for its urgent operationalisation by the end of 2018. Indian Prime Minister, Narendra Modi, reinforced the urgent need for low risk capital to advance the solar revolution. In partnership with the World Bank and the Agence Française de Développement (Afd), the study is now in the process of being developed further in consultation with constituent countries and relevant stakeholders. The aim is to operationalise the CRMM expeditiously.

Key offering

Based on the consultations with all relevant categories of stakeholders, the key proposal is to provide solar resource rich countries with an optional and collective “high-speed route” through which they can access finance at lower cost and in larger volumes; and, **as a pilot, to finance through this collective route a first tranche of 15 GW of solar in 20 countries over 5 years**. This would correspond to approximately 10 billion USD of senior debt to be channelled and de-risked.

Countries could decide on a project by project basis if they wish to go through the usual domestic road, or through the collective International Solar Alliance high-speed route. This optional route would

consist of:

- **a digital platform** to pool the demand and establish a marketplace connecting financiers, solar project developers and insurers and create a “competition effect” among them.
- **a common guarantee** to mitigate the risks that cannot be eliminated otherwise.
- **a common regulatory and contractual framework** to further reduce transaction costs.

Governments willing to go through the collective road for a particular solar energy tender would share the information on the platform and request a quote for a Guarantee in advance for this tender. This quote, as well as the underlying terms and conditions will be encoded in a public digital “Key”. Unique and tender-specific, the Key would allow the evolution of each project to be traced from the initial tender, through construction, and until its refinancing and the issuance of a Guarantee. The Platform would manage these keys and ensure full traceability of projects and assets during their development, installation and operation. These Keys provide developers participating in tenders under the Mechanism with all the necessary information to anticipate access to affordable refinancing capacities at scale, thus enabling them to offer competitive bids.

The Guarantee mechanism would consist of a risk transfer instrument, which would provide dedicated swaps and guarantees on a list of main risks. The Guarantee entity would minimise its capital requirements by transferring a large part of the subscribed risk to existing insurance and hedging instruments offered by MDBs (including WBG, EIB, EBRD, IADB, ADB), DFIs (AFD, KfW, FMO, CDC and OPIC), as well as to private or semi-private insurance and re-insurance entities (TCX, GuarantCo, ATI, AXA, etc.). Existing de-risking mechanisms could thus, benefit from better access to a larger pipeline of solar projects and would be provided with bundled risk packages that can be managed with ease.

Set-up costs

Implementation of the pilot would require:

- **the capitalisation of a guarantee entity: 1 billion USD** in cash and sovereign guarantees, coming from the GCF as well as countries and DFIs willing to contribute; this capital will be supplemented by mutual capital deposits from countries willing to benefit from the de-risking mechanism in proportion of the target guaranteed volumes;
- **initial five years funding for the digital platform that will manage aggregated demand and guarantees: approximately 27 million USD**, to be financed by private and impact capital;

The guarantee fee of the Guarantee entity to de-risk long term debt should range between 0.3% to 2.0% of the debt amount.

Management

The Guarantee entity could be located at any Development Finance Institution (potentially the World Bank). Countries and entities contributing to the capitalisation of the Guarantee entity would:

- define the mandate for the management of guarantees;
- select the entity responsible for implementing the mandate for a 5-year term;
- oversee and ensure that the mandate is well executed.

The Digital Platform would be responsible for the implementation of the above-mentioned mandate. It would be independent from political influences. It would be financed by private and impact capital shareholders. Shareholders of the Digital Platform would consist of well recognized and competent entities. These entities would designate the management team of the Platform.



AN INITIATIVE OF



WORLD BANK GROUP



GIF 2018

ADVISORY COUNCIL MEETING

PANEL

**Deep Dive into the GIF Portfolio:
Climate Smart projects under preparation**

Moderator: Matthew Jordan-Tank, Head of Infrastructure Policy & Project Preparation, EBRD

APRIL 18, 2018

COLOMBIA

Clean Energy Development

GIF FUNDING & LEVERAGE

GIF Project Definition
Support:

\$400,000

Anticipated GIF Project
Preparation and Structuring
Activity:

\$2.5 million

Potential Private Investment
Mobilized:

\$750 million

Colombia is embarking on an ambitious credit enhancement project to mobilize investment for renewable energy and energy efficiency projects. The GIF is providing support for technical assistance for designing the program, building a pipeline of projects, and strengthening the country's capital markets.

EXPECTED PROJECT OUTCOMES

- ◆ Contributes to Colombia's energy security with renewable energy, particularly in regard to diversification and climate risk
- ◆ Is transformative to the small-scale renewable energy and energy efficiency market by breaking down barriers for commercial financing
- ◆ Supports over \$1 billion of investments in renewables and energy efficiency
- ◆ Provides a new financial instrument to facilitate long-term sources of capital in renewable energy and energy efficiency
- ◆ Provides a framework for a complex array of players in the sector, including multiple entities within government, private sector investors, multilateral development banks, and others

TECHNICAL PARTNERS



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

* Based on World Bank Group classification by income

BACKGROUND

Colombia has a mature wholesale electricity market with an installed capacity of 16,595 megawatts, two-thirds of which is generated by hydro power. The government plans to increase capacity to 23,000 megawatts by 2029 to meet expected demand.

The power sector was reformed in 1994, thereby introducing greater competition in a new, wholesale electricity market throughout the entire value chain, including in transmission and retail. Private investment is permitted in all segments of the sector.

Nevertheless, several structural issues limit the potential of Colombia's power sector. These include vulnerability to weather events, limited availability of natural gas, an insufficiently development policy and regulatory environment, and a lack of incentives to develop renewable energy.

As a result, the government seeks to develop sources of renewable energy with support from private sector investors. This effort involves regulatory, technical, and economic initiatives.

The World Bank is preparing a credit enhancement project to assist the government of Colombia and Financiera de Desarrollo Nacional S.A. (FDN), a financial development institution that works with the private sector to develop infrastructure, in mobilizing private sector investments to support a renewable energy and energy efficiency development program. The program will provide a \$81 million credit enhancement to support \$1 billion in private investment.

PROJECT FEATURES

The GIF will provide \$400 thousand in funding for the technical assistance required to support the program.

The GIF's contribution will support:

- ◆ Private investment into small-scale renewable energy projects, including self-generation and co-generation
- ◆ Energy efficiency investments for industrial and commercial businesses
- ◆ Utilizing Colombia's energy potential with utility-scale renewable energy, such as solar and wind

Technical assistance will be conducted in partnership with the World Bank's Public-Private Infrastructure Advisory Facility (PPIAF), the Clean Technology Fund, the NDC Partnership Support Facility, and Switzerland's State Secretariat for Economic Affairs (SECO).

WHY GIF

Colombia's Minister of Energy and FDN requested support from the GIF to provide programmatic support for the development of the credit enhancement program. The GIF is providing a grant of \$400 thousand to:

- ◆ Support FDN in the selection, design and implementation of a pipeline of large and small-scale wind and solar projects as well as energy efficiency initiatives
- ◆ Develop a financing vehicle by aggregating small-scale projects and identifying investment vehicles
- ◆ Conduct legal, financial and economic analyses to support FDN's due diligence of financing
- ◆ Design standard power purchase agreements for utility-scale renewable energy projects
- ◆ GIF's involvement will help to kick-start the market for renewable energy and energy efficiency in Colombia. The GIF support provides investors and lenders greater confidence with new financial products, thereby diversifying potential sources of long-term debt financing for clean energy projects in Colombia. The GIF support will also help to coordinate and reduce institutional complexity and helps integrate donor support.

The Global Infrastructure Facility, or GIF, is a partnership of governments, multilateral development banks and private sector financiers that facilitates private-sector investment in complex infrastructure projects in emerging economies. We serve as a platform through which governments collaborate with international financial institutions and private sector investors to design, structure and implement these complex projects.

The comprehensive project-preparation support provided by the GIF draws on the expertise of its advisory partners which includes commercial banks and institutional investors. The broad partnership ensures that well-structured and bankable infrastructure projects are brought to market in a way that meets the needs of governments and service users in a sustainable way.

VIETNAM

Credit Rating Readiness and Preparation for Vietnam Electricity

GIF FUNDING & LEVERAGE

GIF Approved Project
Definition Support:

\$500,000

Estimated Project Support:

\$1,000,000 to 2,000,000

Potential Private Investment
Mobilized:

\$500,000,000

Vietnam Electricity (EVN) aims to issue an international bond and obtain a credit rating as the first step. The GIF is providing a grant and technical assistance to help EVN with its strategy and approach.

EXPECTED PROJECT OUTCOMES

- ◆ EVN will take steps to comply with International Financial Reporting Standards to improve transparency
- ◆ EVN will obtain a credit rating
- ◆ EVN will diversify its financing sources through an international bond issuance

TECHNICAL PARTNERS



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

* Based on World Bank Group classification by income

BACKGROUND

Vietnam is experiencing double digit growth in domestic demand for electricity. To meet this growing demand, state-owned enterprise (SOE), EVN will need to contribute a significant amount towards the Government of Vietnam's broader investment program in the energy sector. EVN has been accustomed to operating on a public-sector financing model complemented by Overseas Development Assistance (ODA). Yet, constrained ODA flows, the Government of Vietnam's limited ability to offer government guarantees, and the large amounts of investments needed, dictate that EVN pursue more commercial financing opportunities.

EVN aims to issue an international bond, and to do so it will have to obtain a credit rating. The GIF is providing a grant and technical assistance to help EVN with its strategy and approach.

The project is co-led by the World Bank's Energy Global Practice and the GIF. EVN will be the counterpart of this GIF activity, with close communications with Ministry of Industry and Trade (MOIT), Ministry of Finance (MOF) and other organizations as needed in the credit rating preparation and execution process.

PROJECT FEATURES

The GIF will provide a grant and technical assistance to help EVN define and articulate its overall strategy for issuing an international bond. It will review legal and regulatory requirements, enhance EVN's existing documents readiness for rating execution, survey historical ratings of comparable SOEs and private companies, conduct a rating

simulation, the actual rating process and provide recommendations on next steps.

Accomplishing this will position the GIF to further assist EVN with structure any necessary credit enhancements that may be needed, carry out the issuance of its first international bond, and mobilize financing from long-term institutional investors and other commercial sources.

WHY GIF

The GIF's core expertise is where public-sector infrastructure meets private financing. To help EVN obtain a credit rating, the GIF brings knowledge of what has worked elsewhere and what eventual EVN bond investor may seek. Specifically, the GIF can help EVN:

- 1. Identify improvements needed to enhance EVN's creditworthiness, helping chart the best course forward.** EVN has a huge financing needs. Undertaking a credit rating assessment will help EVN establish a baseline and preparing it to access international commercial financing with longer tenors.
- 2. Diversify its financing sources through international bond issuance.** The GIF team's experience in infrastructure finance and partnership with GIF Advisory Council members interested in investing in Vietnam will benefit EVN as it develops its bond issuance strategy. This will enable the GIF to pinpoint solutions to challenges that need overcoming for EVN to obtain a credit rating, and throughout the process to provide on demand support and counsel.

The Global Infrastructure Facility, or GIF, is a partnership of governments, multilateral development banks and private sector financiers that facilitates private-sector investment in complex infrastructure projects in emerging economies. We serve as a platform through which governments collaborate with international financial institutions and private sector investors to design, structure and implement these complex projects.

The comprehensive project-preparation support provided by the GIF draws on the expertise of its advisory partners which includes commercial banks and institutional investors. The broad partnership ensures that well-structured and bankable infrastructure projects are brought to market in a way that meets the needs of governments and service users in a sustainable way.

ENERGY

LOWER MIDDLE INCOME *

CLIMATE-SMART

TRADE-ENABLING

TUNISIA

Undersea Electrical Connection

GIF FUNDING & LEVERAGE

GIF Project Definition Grant:

\$350,000

Estimated Project Support:

\$7 million

Potential Private Investment
Mobilized:

€ 120–300 million

Tunisia's demand for power has been growing steadily for the last two decades, while its national gas production has been falling. This led the government to reconsider its energy strategy. One option is purchasing power from Europe through an interconnector cable between Tunisia and Italy's power grid. A GIF grant is supporting the development of this project.

EXPECTED PROJECT OUTCOMES

- ◆ Provide Tunisia with power at competitive rates and strengthen the security of supply
- ◆ Facilitate trade in electricity between North Africa and Europe
- ◆ Achieve climate smart objective through emissions reductions with electricity generated to high environmental standards, and
- ◆ Lay the groundwork for future integration and export of renewable solar energy to Europe
- ◆ The GIF will provide support to the government until financial close. Half of the GIF funds will be reimbursable upon reaching financial close.

TECHNICAL PARTNERS



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

* Based on World Bank Group classification by income

BACKGROUND

Demand for electricity in Tunisia has been growing at an average of 3.6 percent annually between 2010 and 2015. Its growing peak demand—currently at 4,000 megawatts—is likely to outstrip its generation capacity soon. To meet future demand, it must either increase supply by importing electricity or developing new power sources. Currently, 85 percent of Tunisian electricity is generated from natural gas produced domestically and in Algeria with installed capacity of 5,224 megawatts. However, the structural trend of increasing reliance on hydrocarbon imports and depleting local resources have considerably eroded Tunisia’s energy independence and is unsustainable.

Tunisia has several options towards reducing its power deficit, including development of solar and wind power, developing new gas fields, or importing gas or electricity. A combination of increasing renewable power generation and importing electricity from Europe could address the key investment and energy needs of the country. However, importing surplus electricity from Europe is an attractive option but will involve complex bilateral agreements between private and state-owned firms as well as the participation of international development institutions.

STEG, a state-owned enterprise, is responsible for most power generation and all electricity distribution in Tunisia. STEG is semi-autonomous and is regulated by the Ministry of Energy and Mines.

PROJECT FEATURES

The proposed project will lay a 200-kilometer long subsea power cable with a capacity of 600 megawatts between Tunisia and Sicily in Italy. The cable will supply up to 16 percent of Tunisia’s power needs. In due course, it will also enable exports of power from Tunisia to Europe, especially renewable energy. It will also close the Europe-Maghreb network loop that runs through Morocco, Spain, France,

Italy, Tunisia, and Algeria, and help to create an integrated grid in the region.

Investment requirements are estimated around €600 million. Because of the large capital costs, large economic benefits, and to achieve the best value for money, the sponsors are considering a range of financing options including equity financing, grant financing from the European Union, concessional financing from development finance institutions, and financing from private banks. Given its complexity and strategic importance, it is likely that the interconnector will need public sector involvement on the part of STEG and the government of Tunisia.

The sponsors of the project are STEG, the Tunisian government, and the Terna Group, the private Italian power grid operator.

WHY GIF

The GIF provided a Project Definition Activity of about \$350,000 to support its technical partner, the World Bank’s Energy Global Practice, to develop a high-level options analysis and transaction design and to identify additional work required at the project preparation stage. The GIF is now committing an additional \$7 million to fund project preparation and transaction advisory work. The support will include:

- ◆ Undertaking technical feasibility and environmental and social impact studies
- ◆ Agreeing on the commercial and regulatory structure
- ◆ Supporting the transaction design, including ownership and governance arrangements for the line and the approach to procurement
- ◆ Developing the financial model assessing the viability of the project vehicle
- ◆ Negotiating and securing the necessary financing plan for the interconnector including assessing equity from the sponsors, and liaising with private providers and other DFIs

The Global Infrastructure Facility, or GIF, is a partnership of governments, multilateral development banks and private sector financiers that facilitates private-sector investment in complex infrastructure projects in emerging economies. We serve as a platform through which governments collaborate with international financial institutions and private sector investors to design, structure and implement these complex projects.

The comprehensive project-preparation support provided by the GIF draws on the expertise of its advisory partners which includes commercial banks and institutional investors. The broad partnership ensures that well-structured and bankable infrastructure projects are brought to market in a way that meets the needs of governments and service users in a sustainable way.

Bios

CO-CHAIRS



Joaquim Levy

Managing Director and World Bank Group Chief Financial Officer

Joaquim Levy is responsible for the financial and risk management strategies of the World Bank Group and for the institutions that make up the Group. This includes development of new, innovative financial products and services, oversight of the financial reporting, risk management, and mobilization of financial resources in alignment with the Group's strategy. Levy contributes to the international dialogue on financial standards and best practices, primarily through his representation of the Group at the Financial Stability Board. Levy joined the World Bank Group in February 2016. Previously, he served as the Minister of Finance for the Federal Republic of Brazil, working with the president and government in reforming the world's fifth largest economy. Levy holds a doctorate in economics from the University of Chicago (1992); a master's in economics from Getúlio Vargas Foundation (1987); and graduated in Naval Architecture and Marine Engineering from the Federal University of Rio de Janeiro.



Macky Tall

Executive Vice President, Infrastructure, CDPQ and President and CEO, CDPQ Infra

Macky Tall is responsible for CDPQ's infrastructure investment strategy. Tall oversees the teams that carry out infrastructure investment activities worldwide. He is also in charge of CDPQ Infra, a CDPQ subsidiary whose mandate is to take over the planning, execution and operation of public infrastructure projects. Tall serves on CDPQ's Executive Committee and Investment-Risk Committee. Tall joined CDPQ in 2004 as Director, Investment, Infrastructure, and accelerated the implementation of a business model focused on strategic partnerships with the largest infrastructure operators in the world. Before joining CDPQ, Tall held several senior management positions with companies in the energy and finance sectors, namely Hydro Québec, MEG International, Novergaz and Probyn & Company. Tall holds a Bachelor's degree in Business Administration (Finance) from HEC Montréal and an MBA (Finance) from the University of Ottawa. He also completed an undergraduate degree in Economics at Université de Montréal.

SPEAKERS



Alzbeta Klein

Director, International Finance Corporation

Alzbeta Klein was named IFC's Director and Global Head of Climate Business in January 2017 to facilitate business growth, provide thought leadership, fundraise and facilitate all work related to renewables, climate smart agribusiness, green bonds and other climate business areas. Prior to her recent appointment, she was a Global Co-Head of Industrials for IFC, managing a \$15bn portfolio of investments in emerging markets. Alzbeta joined IFC from Export Development Canada. She received a Master's degree in Economics from the University of Ottawa, Canada, where she also studied for her doctorate; engineering degree from Prague University, Czech Republic; and executive education from Harvard Business School and INSEAD. She holds a Chartered Financial Analyst (CFA) designation. She currently serves on the boards of Hans Merensky in South Africa, Grupo Los Grobo in Argentina, both agribusiness companies and on the New York University Center for Sustainable Business Advisory Board.



Andreas "Andy" Jobst

Adviser to MDCFO, World Bank Group

Andreas (Andy) Jobst is Adviser to the Managing Director and Chief Financial Officer of the World Bank Group (since September 2016). Previously he was responsible for monetary and financial sector policy of the euro area in the European Department of the International Monetary Fund (IMF). Until 2014, he spent three years as Chief Economist and Deputy Director (Supervision) of the Bermuda Monetary Authority (BMA). During this time, he was heavily involved in the International Association of Insurance Supervisors (IAIS) as member of the Financial Stability Committee (FSC) and served as Vice-Chair of the Financial Stability Data Specialists Subcommittee (FSD). Before his appointment at the BMA, Andy was a mid-career economist at the IMF, where served as one of the main authors of the Global Financial Stability Report (GFSR) and led the stress testing exercises (solvency/liquidity) as part of the Financial Sector Assessment Program (FSAP). He also worked at the Federal Deposit Insurance Corporation (FDIC), the Deutsche Bundesbank, the European Central Bank (ECB), the Bank of England, and Deutsche Bank (London). Andy served in the Royal Bermuda Regiment (2011-2014) and is currently Lieutenant-Colonel (Reserve) in the German Armed Forces. Andy holds a PhD from the London School of Economics (LSE) and was also educated at Oxford and Cambridge.



Bernardo Tavares de Almeida

Senior Investment Officer, International Finance Corporation

Bernardo previously worked as "Executive Director of Minas Gerais Development Bank (BDMG)" in charge of front office, middle office, structured operations and new businesses. Before, Bernardo worked at EBP, Estururadora Brasileira de Projetos, as "Project Director of PPP and Concession initiatives". He also held executive positions in Minas Gerais Government, such as Deputy Secretary of Planning and Management and President of the State Financial and Budget Board. Bernardo has a Master degree in Economic Regulation from Federal University of Minas Gerais -UFMG.



Bhanu Mehrotra

Senior Investment Officer, International Finance Corporation

Bhanu Mehrotra is the Sector Lead for PPP Advisory in Solar and Wind Power at IFC - International Finance Corporation, based in South Delhi, Delhi, India. He joined the IFC as an Investment Officer in 2008. Prior to the IFC, Mr. Mehrotra was head of Public Private Partnerships at CRISIL and Deputy Secretary to the Government of India for the Prime Minister's Secretariat on Infrastructure. He has a bachelor's in Technology and Civil Engineering from the Indian Institute of Technology Kanpur and specialized training from INSEAD as part of IFC's Global Business Leadership program.



Dalia Wahba

Country Manager, for the Levant at the International Finance Corporation

Dalia Wahba joined IFC in 2006. She assumed her role as country manager for the Levant countries, covering Jordan, Lebanon, Iraq and Syria in August 2017. Before moving to Amman, Ms Wahba was a Senior Investment Officer in the Global Infrastructure Department for IFC covering power, transport and utilities in the MENA region with a primary focus on Egypt and Lebanon. She was also acting head for Egypt for over a year. Over her years in IFC Ms Wahba worked on projects in Egypt, Bahrain, Kuwait and Jordan in the chemicals, construction and financial sectors. In the last few years Ms. Wahba was involved in financing a number of infrastructure projects in different parts of the MENA region including the landmark investment in Egypt's solar PV feed in tariff program. Prior to joining IFC Ms. Wahba spent 7 years with the Commercial International Bank in Egypt. She worked in the investment banking department. Her last position was Manager in the Corporate Finance team.



Duncan Caird

Managing Director, Head of Infrastructure & Real Estate Group - The Americas, Global Banking & Markets, HSBC

Duncan Caird is the Head of Infrastructure & Real Estate Group – The Americas and Managing Director of the IRG HSBC New York. Duncan joined HSBC in 2006 to lead the Americas team in advisory, project and export financing strategy for key clients with a focus on cross border transactions. Duncan has financed a wide range of projects and business, across all sectors: Infrastructure/concession financing (PPP), Transport (ports, roads, bridges, airports), the Oil and Gas sector, mining in copper, iron and gold, extensively in the Power sector with experience in thermal and renewables as well as transmission/distribution, Telecoms (incl. miltatcom) Previously based in London focused on the European market with senior roles as BofA, CIT, BOTM, Westpac and CIT and expertise in financial advisory, investing and underwriting, acquisition finance, asset finance and predominately project or structured financings (accessing the bank and bond markets). Duncan has an LLB from Victoria NZ, and is admitted to the High Court of NZ as Barrister and Solicitor



Edith "Edie" Quintrell

Vice President, Global Themes, World Bank

Edie Quintrell is currently Director of Underwriting Development with Liberty Specialty Markets, a London-based subsidiary of Liberty Mutual Insurance Group and one of the leading private providers of credit and political risk insurance. Based in Washington, DC, her role is to expand relationships globally with export credit agencies, development finance institutions and multilateral organizations. From 2007-2015 Ms. Quintrell served as Director of the Operations Group of the Multilateral Investment Guarantee Agency (MIGA), the political risk insurance arm of the World Bank Group. Prior to joining MIGA, Ms. Quintrell held various senior level positions at the Overseas Private Investment Corporation (OPIC) from 1991 to 2007, including Vice President for Insurance. Ms. Quintrell has also been active in the Berne Union, including as Chair of the Investment Insurance Committee. She holds a bachelor's degree in political science and Latin American studies from Princeton University, and a master's degree in international affairs from the Johns Hopkins School of Advanced International Studies. Ms. Quintrell was a Fulbright Scholar at the Universidad de los Andes in Bogota, Colombia from 1985-1986



Emmanuelle Nasse Bridier

Group Chief Credit Officer, Group Investment & ALM, AXA Group

Emmanuelle Nasse Bridier is Chief Credit Officer at AXA Group. She was previously head of AXA France strategic asset allocation. Emmanuelle started her career in Credit Lyonnais Group, where her last position was vice president of Securitization Division in charge of structuring RMBS and ABS transactions. She joined AXA Group in 1999 to create and develop AXA IM ABS Department. She was head of AXA IM ABS team until 2004 when she joined Fitch Ratings as Managing Director, Head of Structured products Team for Continental Europe. She returned to AXA Group in January 2009, where she oversaw strategic asset allocation for AXA France general account. She was promoted Head of AXA Group Credit Team and AXA Group Chief Credit Officer in January 2013.



Hartwig Schafer

Vice President, Global Themes, World Bank

Hartwig Schafer became Vice President, Global Themes on July 1, 2017. In this position, he oversees the World Bank's engagement in the corporate priority areas of Fragility, Conflict and Violence (FCV), Gender, Infrastructure/PPPs/Guarantees, Climate Change and Knowledge Management. This Vice-Presidency strengthens multi-Global Practice collaboration and overall responsiveness to clients. In his most recent role as Vice President, Operations Policy and Country Services, Schafer was responsible for the World Bank's business policies, practices and procedures for lending products and knowledge services for client countries. He led a number of key reforms, including roll-out of the Bank's new policies on procurement and environmental and social safeguards and innovation of the Bank's lending and knowledge instruments. Schafer, a German national, has worked for over 27 years in technical and managerial positions in the World Bank, as well as the European Commission. He brings strong operational experience across several regions and sectors. His academic background is in Economics (PhD) and Agricultural Economics.



Fuat Savas

Executive Director, Infrastructure Finance and Advisory, JP Morgan Chase

Fuat Savas is an Executive Director in J.P. Morgan's Infrastructure Finance and Advisory ("IFA") team, focusing on Emerging Markets. Fuat's ongoing financing and advisory work includes fundraising for a public-private infrastructure fund in Africa, and acting in various lead financing roles for transportation, renewables and mid-stream energy projects in Latin America, Eastern Europe, Middle East and South Asia. Prior to joining IFA, Fuat was responsible for J.P. Morgan's Development Finance Initiative. As a part of this role, Fuat worked with multilateral and bilateral development agencies to mobilize institutional investors for developmental projects in low and middle-income countries, focusing on raising capital for key infrastructure projects, and on advising borrowers on capital structure and fundraising assignments. Before starting the Development Finance Initiative, Fuat was a Vice President in the Government and Transportation Finance group, originating, structuring and marketing obligations guaranteed by the U.S. Government in support of public policy goals. Fuat holds a BA in Economics and Literature from Yale University.



John Roome

Senior Director, Climate Change, World Bank

John Roome is Senior Director for Climate Change at the World Bank. As Senior Director, John not only leads a team of specialists but works across the World Bank Group to advance the institution's climate change agenda. Prior to this assignment he was Operations and Strategy Director for Global Practices and Cross Cutting Solutions at the World Bank. He previously served as Director for Sustainable Development in the Bank's East Asia and the Pacific Region, responsible for working with 22 client countries in the region in the water, urban, transport, energy, rural, agriculture, environment, and social sectors, as well as in disaster risk management and climate change. John also worked as Operations and Strategy Director in the Bank's South Asia region and as Operational Quality Director in the Bank's Africa region for five years. He joined the World Bank in 1989, working initially in Africa. Before joining the World Bank, John worked in Europe for Monitor Company, a leading corporate strategy consulting firm, and at Old Mutual, a South African Life Assurance Company. He was educated at Oxford University, where he obtained Masters Degrees in Econometrics and in Management Studies, and the University of Cape Town where he obtained a Bachelor's degree in Economics, Statistics and Actuarial Science.



Jordan Schwartz

Director, Infrastructure, PPPs and Guarantees, World Bank

Jordan Schwartz has worked in economic development since 1991, focusing on infrastructure economics, finance, regulation, connectivity, logistics and sustainability. He has been at the World Bank since 1998 and is currently serving as the Director of the Infrastructure, PPPs & Guarantees (IPG) Group. From 2014 to 2017, Jordan was based in Singapore where he was the Director of the World Bank's Infrastructure & Urban Development Hub, a center of operational and analytical activity covering the sectors of water, transport, ICT, energy and extractives, urban, trade, and infrastructure finance. In his prior capacity, Jordan served as the Head of the Global Infrastructure Facility, as the World Bank's Manager for Infrastructure Policy, and, before that, as Lead Economist in the Sustainable Development Department of the World Bank's Latin America and the Caribbean Region. Jordan worked in management consulting from 1991 to 1998, before joining the World Bank, first at Booz Allen's Transport Strategy Consulting Group, and later, as the Senior Manager for Utility & Infrastructure Consulting at Deloitte Emerging Markets. Jordan is an author and frequent speaker on a wide range of topics in development economics and finance. He is a co-author of the book "Uncovering the Drivers of Utility Performance: The Role of the Private Sector, Regulation and Governance," as well as a series of papers, articles and blogs on the relationship of risk to infrastructure investment. He has led investment and technical advisory work across Latin America and the Caribbean, East Asia, the Pacific Islands, Central Europe and Sub-Saharan Africa and has served as a delegate of the World Bank to the G20 Infrastructure & Investment Working Group, the B20 and APEC.



Kanika Chawla

Senior Programme Lead, Council on Energy, Environment and Water

Kanika Chawla is a policy specialist, working at the intersection of India's two revolutions: in renewable energy and in financial markets. As Senior Program Lead at CEEW, she manages the work on renewable energy policy, finance, jobs and skills. Her current responsibilities include: analyzing financial risks affecting renewable energy investments in India, changing market conditions and tax regimes and their impact on renewable energy; managing CEEW's periodic surveys on RE jobs; and convening a high-level working group on renewable energy finance (comprising investors, developers and manufacturers). She is actively engaged with private and public enterprises within and outside India to design and develop new financial de-risking instruments and new financial institutions, such as green banks. She also works on the political economy of renewable energy and energy transitions. Prior to CEEW, she worked at the REN21 Secretariat in Paris, and was one of the authors of the REN21's Global Status Reports on Renewable Energy. Kanika holds an M.Sc in Economics and Development Economics from the University of Nottingham and an undergraduate honors degree in Economics from Miranda House, University of Delhi. She is fluent in English and Hindi and speaks basic French.



Lakshmi Shyam-Sunder

Vice President and World Bank Group Chief Risk Officer

Lakshmi Shyam-Sunder is Vice President and World Bank Group Chief Risk Officer. Lakshmi was previously Chief Financial Officer and Director, Finance and Risk at the Multilateral Investment Guarantee Agency (MIGA), the political risk insurance and credit enhancement arm of the World Bank Group. Prior to joining MIGA in March 2011, she worked since 1994 at the International Finance Corporation (IFC), also part of the World Bank Group, where she was Director for Corporate Risk, and Director of IFC's Risk Management and Financial Policy Department. She helped develop IFC's client risk management advisory services and IFC's portfolio risk metrics which formed the foundation for the GEMs initiative across MDBs. She led the development of IFC's integrated capital framework and was responsible for all financial risks in Treasury, lending and equity investment operations as well as rating agency issues. She was also Co-Chair of IFC's New Products Assessment Group. Lakshmi has consulted for a range of public and private sector institutions in the U.S. and in emerging markets. She has also served on the Board, and Finance and Risk Committees of institutions in emerging markets. Before joining IFC, Lakshmi was a faculty member at the MIT Sloan School of Management and earlier at the Tuck School of Business Administration at Dartmouth College. She has a Ph.D. in Finance from the MIT Sloan School of Management and an MBA from the Indian Institute of Management, Ahmedabad.



Luis Fernando Perdigon

Managing Director & Head of Project Finance, SMBC

Luis Fernando heads SMBC's Project Finance team for Latin America, a team of over 20 professionals in New York and Latin America with expertise in structuring and execution of complex transaction in power, infrastructure, petrochemicals, oil & gas and natural resources industries in countries like Brazil, Mexico, Chile, Peru, Colombia, Panama, etc. He has over 20 years of banking experience and a strong project and structured finance background. Also, he currently sits at the Board of Directors of Financiera de Desarrollo Nacional – FDN, a Development Bank, majority-owned by the Colombian Government. Before his current role, Luis Fernando spent 5 years in Colombia as Country Manager and head of coverage for Peru and Panama. His team is currently involved in the most ambitious projects in Latin America in Power & Renewables, Infrastructure and Natural Resources, where they advise, lend and structure debt capital markets and loan transactions. Luis Fernando holds a B.A. in Engineering from Universidad de los Andes (Colombia), a diploma in Corporate Finance and completed levels I and II of the CFA program.



Manu Srivastava

Principal Secretary, New & Renewable Energy Department, Government of Madhya Pradesh, India

Manu Srivastava is the Principal Secretary for the Department of New & Renewable Energy, and Science & Technology in the Government of Madhya Pradesh (MP), India. During his time as Principal Secretary, he has overseen a 282% increase of renewable energy capacity (from 1022 to 3909 MW). Chief among his accomplishments in this role include implementing the Rewa Ultra Mega Solar Project (750MW, PV Solar Park); the first project in India to break the grid parity barrier. While federal government companies were giving subsidy to achieve a tariff of US cents 7 per unit, Rewa, a project led at the state level, achieved a first-year tariff of US cents 4.5 per unit. In addition to getting the complex Rewa project off the ground, Mr. Srivastava oversaw the the tender for the largest number of solar pumps in the world (18,500), leading to large efficiency and cost gains. Prior to working for the Government of MP, Mr. Srivastava was Managing Director, Madhya Pradesh Power Management Company and Chairperson of MP Discoms (2012-15). He has a B. Tech in Electrical Engineering and an M. Tech in Telecommunications from IIT, Delhi. He also has a M.Phil from IIPA, Delhi



Marcello Estevão

Secretary of International Affairs (Deputy Minister), Ministry of Finance, Brazil, and co-chair of the G20-Infrastructure Working Group

Marcello Estevão is Secretary for International Affairs in Brazil's Ministry of Finance. Prior to this role he worked for over 15 years at the International Monetary Fund (IMF), serving as mission chief for Peru and Deputy Chief, Regional Studies Division (2015), mission chief for Nicaragua (2011-2013), mission chief for Barbados (2009-2010) and Deputy Chief North America Division (2008-2011) and Senior Economist (Brazil 2006-2007, European Union and euro area, 2005); Economist (European Union and euro area, 2004; France, Belgium and Poland, April 2000 to 2003. Between 2013 and 2015 he took a leave of absence from the IMF to work as Chief Economist for Tudor Investment Corporation. Prior to working at the IMF he spent five years working at the U.S. Federal Reserve Board as an economist. He has a B.A. and M.A. in Economics from Pontificia Universidade Catolica in Brazil and a PhD in Economics from Massachusetts Institute of Technology.



Matthew Jordan-Tank

Head of Infrastructure Policy and Project Preparation, European Bank for Reconstruction and Development

Matthew Jordan-Tank is the Head of Infrastructure Policy and Project Preparation at EBRD, providing support for the Municipal Infrastructure and Transport sectors. The focus of his policy work covers PPPs, emerging market infrastructure support, regulation, tariff reform, commercialization of SOEs and municipal utilities, public service contracting, and performance-based contracting. Jordan-Tank leads the Bank's EUR 40m Infrastructure Project Preparation Facility (IPPF) dedicated to improving the quality and efficiency of project preparation for both PPPs and sustainable infrastructure projects in the public sector, building local capacity, and providing policy advice to the Bank's clients. Previously, he was Senior Urban Transport Specialist at EBRD from 2007-2013, where he focused on both private and public sector urban transport projects. Prior to joining EBRD in 2007, he worked as a Transport Specialist for Inter-American Development Bank in Washington, DC and San Jose, Costa Rica from 1999-2007. He holds a Masters in Planning from the University of Maryland, USA.



Nasser A. Malik

Managing Director, Head of Global Structured Debt, Citigroup

Nasser Malik currently heads a number of structured finance teams within Citi that span global project and infrastructure finance, financing for transportation assets, as well as structured tax-efficient borrowings and investments. Additionally, he is responsible for the U.S. debt Private Placement business. Nasser has been with Citigroup and its different predecessor companies for 26 years. Prior to his current role, he spent 3 years in London responsible for cash-based Fixed Income capital market products. Between 1999 and 2002, Nasser was a Director on the Fixed Income Syndicate desk, responsible for the underwriting of bonds from the Emerging Markets. Prior to this, Nasser was a transactor in Liability Management, Global Structured Bonds and Emerging Market securitization. He began his career in Toronto on the Canadian corporate finance team. Nasser holds an MBA from the University of Toronto and a Masters in International Affairs from Columbia University.



Rohit Khanna

Practice Manager, World Bank

Rohit is the Program Manager for ESMAP, overseeing a large portfolio of analytical and advisory activities to inform the energy sector policy dialogue. Under his direction, ESMAP has grown exponentially to support over 250 activities in more than 130 countries; influence World Bank, IDA, and IBRD financing; and leverage billions from global partners to support the growth of and strengthen the design and implementation of investment projects in the sector. Mr Khanna joined the World Bank in 2000, and prior to assuming his current position at ESMAP, he worked on the Global Environment Facility (GEF) and Clean Technology Fund (CTF) at the World Bank. Before joining the World Bank, Mr. Khanna was a Program Officer in the United Nations Environment Program, and worked for Save the Children Fund in its Bhutan Field Office. Under its direction, has been launched the World Bank City Energy Efficiency Transformation Initiative (CEETI). He has a B.A. (honors) in Political Science from University of Delhi and a Master of Public Administration from American University.



Ru Nyambuya

VP, Client Coverage, Corporate & Investment Banking, Standard Bank

Ru Nyambuya is part of the Client Coverage team for Corporate and Investment at Standard Bank in the New York office, where her role is to manage portfolios of clients based in North America but also doing business in Africa. She primarily focusses on Non-Bank Financial Institutions, Mining and Power and Infrastructure sector clients. She joined Standard Bank's NY team in 2012 and truly enjoys being a part of the Africa economic growth and investment story. Ru recently returned to New York after spending almost two years in Johannesburg as the bank's Business Manager for the Power & Infrastructure sector where her role was to help develop and drive execution of Standard Bank's strategy for the sector across the different African countries the bank operates. Prior to Standard Bank, she spent 5 years at Ernst & Young, primarily covering Media & Entertainment clients. Ru is a CPA with a BS in Accounting from Ithaca College and an MBA from the University of Chicago Booth School of Business.



Rui Croca

Operational Manager of the GEMs risk database & Senior Risk Officer, European Investment Bank

Rui Croca was appointed as the Operational Manager of the GEMs risk database in October 2016. He joined the European Investment Bank in February 2015 where he worked as a Senior Risk Officer in the Group Risk Unit focusing on the consolidated risk management of the EIB Group. Rui has worked previously for Citigroup in London where he held functions of Credit Risk Officer responsible for Public Sector and Financial Institutions. Rui also developed his activity in Standard & Poor's Risk Solutions based out of London focusing on credit risk modelling. Prior to that, he worked for Fitch Ratings as a Rating Analyst, and for the Financial Services Authority (currently PRA of Bank of England) supervising investment banking activities in the UK financial market. Rui started his professional activity as an Economist for the Portuguese Securities Market Commission. Mr. Croca holds an Advanced Economics Degree by the ISEG – School of Economics and Management of the Lisbon University. A Master in Monetary Economics and a Specialization in Derivatives and Financial Markets complete his academic background.



Thierry Déau

Founding Partner and CEO, Meridiam and Chairman of the Long-Term Infrastructure Investors Association (LTIIA)

Thierry Déau founded Meridiam in 2005 with the belief that the alignment of interests between the public and private sector can provide critical solutions to the collective needs of communities. He is currently Meridiam's Chairman and Chief Executive Officer, as well as its main shareholder, along with several members of the team. Prior to Meridiam, he worked for France's Caisse des Dépôts et Consignations where he held several positions with its engineering and development subsidiary Egis Projects, moving up from project manager, then director for concession projects to his appointment as Chief Executive Officer in 2001. In addition to being in charge of international operations for the Egis Group executive committee and serving on its risk management committee, Thierry was a member of some of the boards or the chairman of several subsidiaries. Thierry graduated from Ecole Nationale des Ponts et Chaussées engineering school in Paris and began his career in Malaysia with the construction firm of GTM International. Thierry is currently Chairman of the Long Term Infrastructure Investors Association (LTIIA), a board member of Fondation des Ponts, a member of the Investment Committee of the European Fund for Strategic Investment (EFSI), Co-chair of the CEO board for transformational projects and capacity building at the World Economic Forum and Chairman of Archery fund for Inclusive Leadership.



Thomas Bayerl

Head of Infrastructure Debt, MEAG

Thomas Bayerl is Head of Infrastructure Debt at MEAG, which comprises all investment activities of Munich Re and ERGO. He started at MEAG as a Senior Portfolio Manager responsible for the European ABS-Desk and managed ABS/MBS and corporate credit. As he was always looking for new investment opportunities which fit the needs of insurance companies (clients of MEAG), Thomas explored the asset class infrastructure debt and the potential usage for MEAG's investment universe. The following years the asset class infrastructure debt was integrated into the MEAG landscape with start allocation of €4bil and a new team called infrastructure debt which Thomas is heading. Prior to MEAG, Thomas worked for HSH Nordbank (2006-2008) in the investment management unit and was on the structuring-Team at Landesbank Baden-Württemberg in Stuttgart (2004-2005). Thomas has a bachelor and masters in applied mathematics.



Tobias Meier

Global Partnerships, Swiss Re, Key Account Manager, Vice President

Tobias is Swiss Re's Key Account Manager for the World Bank Group. In his previous role in Swiss Re's Global Partnerships team since 2013, he worked with sovereign clients in the EMEA region to build and deepen relationships with governments, development banks and NGOs to develop innovative insurance solutions which help society create effective responses to major risks. Tobias has broad reinsurance underwriting experience in the Middle East and Asia markets, and previously worked as a consultant on donor-funded projects in Africa and the Middle East. Tobias holds a Master's degree in Arabic from the University of Geneva and a MSc in Demography & Health from the London School of Hygiene and Tropical Medicine.



Todd Kowalski

Director of Business Development for Morningstar Indexes

Todd Kowalski is the Director of Business Development for Morningstar Indexes, responsible for driving recognition of the business with asset managers, advisors, consultants, and institutional investors. He joined Morningstar in 2006, serving in multiple service and business development roles, including primary coverage of Morningstar's largest strategic clients. Before joining Morningstar, Kowalski worked for Fisher Investments in Woodside, CA, and prior to that as a Research Associate at NASA's Ames Research Center in Mountain View, CA. He holds a bachelor's degree in Aviation Human Factors from the University of Illinois at Urbana-Champaign.



Vasuki Shastry,

Global Head of Public Affairs and Sustainability, Standard Chartered Bank

Vasuki Shastry is Global Head of Public Affairs and Sustainability at Standard Chartered Bank. He is responsible for coordinating policies and positioning on political matters, reputational risk, and regulatory issues and oversees the Bank's global engagement on sustainability and community investment. Previously, he worked at the International Monetary Fund for 14 years, latterly, as global head, public affairs; headed the communications department of the Monetary Authority of Singapore, and worked as a financial journalist for a number of publications in India, Hong Kong, Singapore and Indonesia. Vasuki also serves on the board of the UK-India Business Council and the Board of Asia House.

Participants

ADVISORY PARTNERS

Amundi Asset Management	Frédéric Samama	Deputy Global Head of Institutional Clients
	Timothee Jaulin	Relationship Manager
Australia and New Zealand Banking Group Limited (ANZ)	Chris Coomans	Head of Resources, Energy & Infrastructure, Americas
	Peter Nealon	Executive Director, ANZ Financial Institutions Group
AXA SA	Emmanuelle Nasse Bridier	Chief Credit Officer
Bank of Tokyo Mitsubishi UFJ Ltd.	Ralph Scholtz	Managing Director
	Tatiana Preta	Director - Project Finance
Banque Ouest Africaine de Développement (BOAD)	Bassary Toure	Vice President
	Nathalie Brou-Fofana	Director Regional PPP Unit
BNP Paribas	Jean-Valery Patin	Head of Power, Infrastructure & Project Finance – Latin America
Caisse de dépôt et placement du Québec (La Caisse)	Macky Tall	Executive Vice President, Infrastructure, CDPQ, and President and CEO, CDPQ Infra.
Citibank, N.A.	Julie Monaco	Head of Global Public Sector, Corporate and Investment Banking
	Nasser Malik	Managing Director
	John Finnigan	Managing Director/Head of Development Organizations
Eastspring	Nadir Maruf	Chief Investment Officer
Financiera de Desarrollo Nacional	Clemente Del Valle	President
	María Clemencia Sierra	Financial Vice President

Global Infrastructure Hub	Mark Mosely	COO
Hong Kong Monetary Authority (HKMA)	Vincent Lee	Executive Director (External) of HKMA and Deputy Director of IFFO
	Susanna Wong	Senior Manager, Market Development Division
HSBC Bank Plc.	Duncan Caird	Managing Director, Head of Project and Export Finance - The Americas Global Capital Financing
Institute of International Finance (IIF)	Sonja Gibbs	Senior Director
	Celso Nozema	Financial Economist, Global Capital Markets Department
International Federation of Consulting Engineers (FIDIC)	Mark Steiner	Principal Advisor, American Council of Engineering
Japan Bank for International Cooperation (JBIC)	Ken Shimamoto	Deputy Director
JP Morgan Chase	Daniel Zelikow	Vice Chairman, Public Sector and Global Co-Head of Infrastructure Finance and Advisory
	Fuat Savas	Executive Director Infrastructure Finance and Advisory
	Etienne Lacroix	Executive Director – Public Sector
Liberty Specialty Markets (LSM)	Edith Quintrell	Director of Underwriting Development
Macquarie Group, Ltd.	Christopher J. Leslie	Executive Chairman, Americas
Meridiam	Thierry Déau	Founding Partner, Chief Executive Officer
MetLife	Robert Rose	Assistant Vice President, Regulatory Policy Group
Mizuho Bank Ltd.	Ignacio Inda	Head of Power & Renewables
Multilateral Investment Guarantee Agency	Hoda Moustafa	Head, African Regional Office
Munich Re	Thomas Bayerl	Head of Infrastructure Debt
	Michael Roth	Senior Manager

Private Infrastructure Development Group (PIDG)	Dianne Rudo	Principal, Rudo International
Santander	Beatriz de la Mata	Export Finance Americas
Standard Bank	Ru Nyambuya	VP, Client Coverage, Corporate & Investment Banking
Standard Chartered Bank	Vasuki Shastry	Global Head of Public Affairs and Sustainability
	Surya Bagchi	Global Head of Project and Export Finance
	Jukka Pihlman	Managing Director, Global Head, Central Banks & Sovereign Funds
	Sridhar Nagarajan	Director, Project & Export Finance
Sumitomo Mitsui Banking Corporation (SMBC)	Rajeev Kannan	Executive Officer, Head of Investment Banking Asia
	Luis Fernando Perdigon	Managing Director & Group Head, Project Finance – Latin America
	Anne Marie Thurber	Executive Director, Group Head of Export and Agency Finance Americas, Global Trade Finance Department
Sustainable Infrastructure Foundation (SIF- Source)	Chris Dossarps	CEO
Swiss Re Ltd.	Luca Alberti	Head EIM Equities and Private Debt
	Tobias Meier	Vice President
UBS	Simon Smiles	Chief Investment Officer - Ultra High Net Worth
	Mark Haefele	Global Chief Investment Officer
World Pensions Council	M. Nicolas J. Firzli	Director-General, Head of Research

FUNDING PARTNERS

Australia	John Larkin	Assistant Secretary, Banks and Infrastructure Finance Branch, Multilateral Development and Finance Division, Department of Foreign Affairs and Trade
	Sean Batten	Director of Global Development Policy

	Mary Lewicka	Director
Canada	Neil Saravanamuttoo	Chief, Multilateral Institutions, Department of Finance
	Sarah Tessier	Economist, Multilateral Institutions, Department of Finance
	Shehryar Sarwar	Deputy Director, Bretton Woods Unit, Global Affairs
China	Ye Jiandi	Director, International Financial Institutions Division I, Department of International Economic & Financial Cooperation, Ministry of Finance
	Zhang Lei	Deputy Director, International Financial Institutions Division I, Department of International Economic & Financial Cooperation, Ministry of Finance
Japan	Toshihisa Aoyagi	Section Chief, MDBs Division, International Bureau
Singapore	Kathy Lai	Deputy CEO, Enterprise Singapore
	Jessica Bin	Development Partner, Enterprise Singapore
World Bank	Laurence Carter	Senior Director, Infrastructure, PPPs and Guarantees

TECHNICAL PARTNERS

African Development Bank (AfDB)	Astrid Manroth	Director for Energy Transformative Partnerships
	Abdu Mukhtar	Director for Industrial and Trade Development
Asian Development Bank (ADB)	Takeo Koike	OPPP Director
	Timothy Meaney	Principal Infrastructure Finance Specialist
	Almaz Galiev	Principal PPP Specialist
Asia Infrastructure Investment Bank (AIIB)	Wang Bin	Senior Officer
European Bank for Reconstruction and Development (ERBD)	Matthew Jordan-Tank	Head of Infrastructure Policy & Project Preparation

European Investment Bank (EIB)	Rui Croca	Operational Manager of the GEMs Risk Database & Senior Risk Officer, European Investment Bank
	Guido Bichisao	Director of Institutional Strategy
International Bank for Reconstruction and Development (IBRD)	Jordan Schwartz	Director, Infrastructure, PPPs and Guarantees
Inter-American Development Bank (IADB)	Gastón Astesiano	Public Private Partnerships (PPP) Team Leader, Vice-presidency for Countries
	Jose Luis Irigoyen	Infrastructure and Energy Sector
International Finance Corporation (IFC)	Emmanuel Nyirinkindi	Senior Manager
	Adam Schwartzman	Global Manager, Upstream Infrastructure and Natural Resources
Islamic Development Bank (IsDB)	Amadou Thierno Diallo	Director, Global Practice, Economic & Social Infrastructure

BENEFICIARY PARTNERS

Argentina	Mathias M. Mondino	Director of Infrastructure - G20, Ministerio de Hacienda
Bulgaria	Ana Mihaylova	Senior Advisor to Executive Director

OTHERS

Brazil	Marcello Estevão	Co-chair of the G20-Infrastructure Working Group and Secretary of International Affairs (Deputy Minister), Ministry of Finance, Brazil
	Erivaldo Gomes	Deputy Secretary for International Affairs
Council on Energy, Environment and Water	Kanika Chawla	Senior Programme Lead
India	Manu Srivastava	Principal Secretary, New & Renewable Energy Department, Government of Madhya Pradesh

Morningstar	Todd Kowalski	Director of Business Development, Indexes
	Robert Cessine	Senior Product Manager, Fixed Income

OBSERVERS

European Commission	Kay Parplies	Head of Unit, Investment and Innovative Financing, DG International Cooperation & Development
Moody's Investors Service	Walter Winrow	Chief, Infrastructure Finance Group
	Andrew Davison	Senior Vice President, Infrastructure Finance Group
Standard and Poor's	Mar Beltran	Senior Director
	Trevor d'Olier-Lees	Senior Director
TCX Fund	Ruurd Brouwer	CEO
	Harald Hirschhofer	Senior Advisor
World Economic Forum	Vangelis Papakonstantinou	Lead, Infrastructure Initiatives

WORLD BANK GROUP

Alzbeta Klein	Director, IFC
Andreas Alexander Jobst	Adviser
Anjali Varma	Principal Syndications Officer, IFC
Arun Sharma	Chief Investment Officer
Bernardo Tavares de Almeida	Senior Investment Officer
Bhanu Mehrotra	Senior Investment Officer, IFC
Carl Chastenay	Senior Syndications Officer, IFC
Dalia Wahba	Country Manager, World Bank
Diane Carol Damskey	Adviser
Hart Schafer	Vice President

James Close	Director, Climate Change
Joaquim Levy	Managing Director and WBG Chief Financial Officer
John Roome	Senior Director, Climate Change
Jyoti Shukla	Director, East Asia and Pacific Regional Office
Lakshmi Shyam-Sunder	Vice President and WBG Chief Risk Officer
Paul Procee	Program Leader
Richard Cabello	Manager
Rohit Khanna	Manager

GIF

Jason Zhengrong Lu	Head
Towfiqua Hoque	Senior Infrastructure Finance Specialist
Sanae Sasamori	Senior Infrastructure Finance Specialist
Edwin (Hin Lung) Yuen	Senior Infrastructure Finance Specialist
Rob Pilkington	Infrastructure Specialist
Michael Tran	Infrastructure Specialist
Zanele Hlatshwayo	Infrastructure Specialist
Rui Ma	Operations Analyst
Neeli Shah	Consultant
Juan Martinez Alvarez	Consultant
Adrian Ernesto Ortega Andrade	Consultant
Christine Marie Shepherd	Consultant
Fern Patrice Gray	Consultant
Luningning L. Pablo	Temporary Assistant

