



CLEAN ENERGY
MINISTERIAL

Accelerating the Transition to Clean Energy Technologies

INTERSECTION OF POLICY AND FINANCE FOR RENEWABLES

Pre-Read for Public-Private Roundtable

Clean Energy Ministerial
16:15-17:45
17 April 2013
Taj Palace
New Delhi, India

Prepared by:
Bloomberg New Energy Finance
www.bnef.com

OUTLINE

- 1 Objective**
- 2 Current Landscape**
- 3 Barriers**
- 4 Potential solutions**
- 5 Opportunities for progress**

SCOPE

- **Presentation:** This session will discuss factors that impact growth in renewable energy (RE) financing, including project risks, risk mitigation strategies, flexible policy design and financial regulations.
- **CEM Roundtable:** Provides an important opportunity to synthesize the lessons learned from history, and bring together practitioners and policymakers to cooperatively address the barriers faced today and discuss potential solutions that can overcome these barriers.
- The information in this presentation is based on the work conducted by **Bloomberg New Energy Finance**.

Roundtable Concept

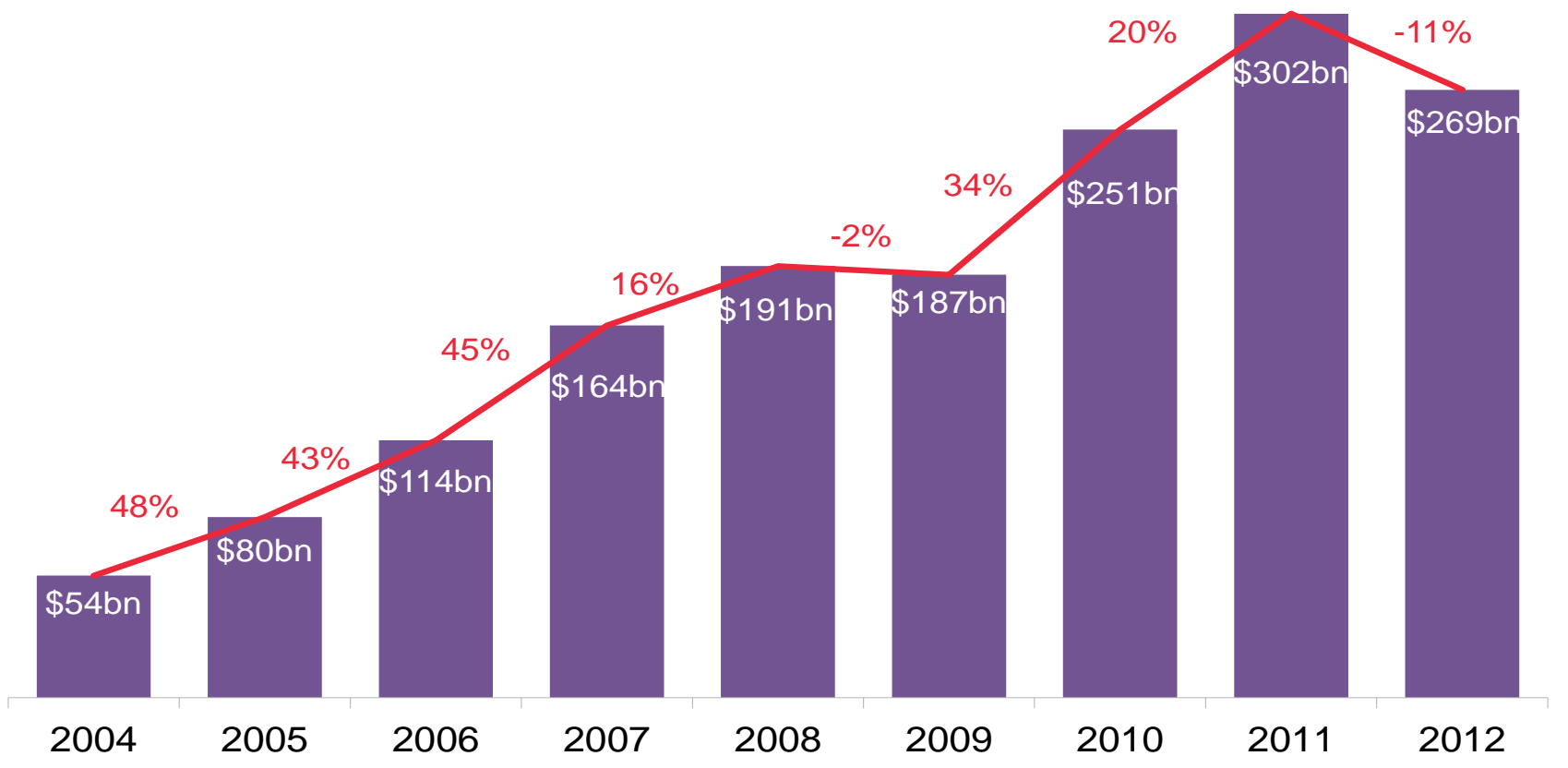
- In this roundtable, participants will address four key questions relevant to RE finance and policy:
 - What types of robust, long-lasting, and flexible policies will aid both policy makers and the finance community in adapting to a changing and evolving energy environment?
 - How can decision makers balance short-term financing decisions with long-term policy planning to take advantage of identified RE resource potentials?
 - How can the creditworthiness of government-owned off-takers be enhanced?
 - What can governments do to encourage wider availability of low cost debt?

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GLOBAL TOTAL NEW INVESTMENT IN CLEAN ENERGY 2004–12 (\$BN)

- Clean energy investments decline in 2012 due to regulatory uncertainty in big markets like the US, India, Spain and Italy. Sharply lower prices of solar and wind technologies also exerted downward pressure on investment volumes, though they allow more installation capacity per dollar of funding.

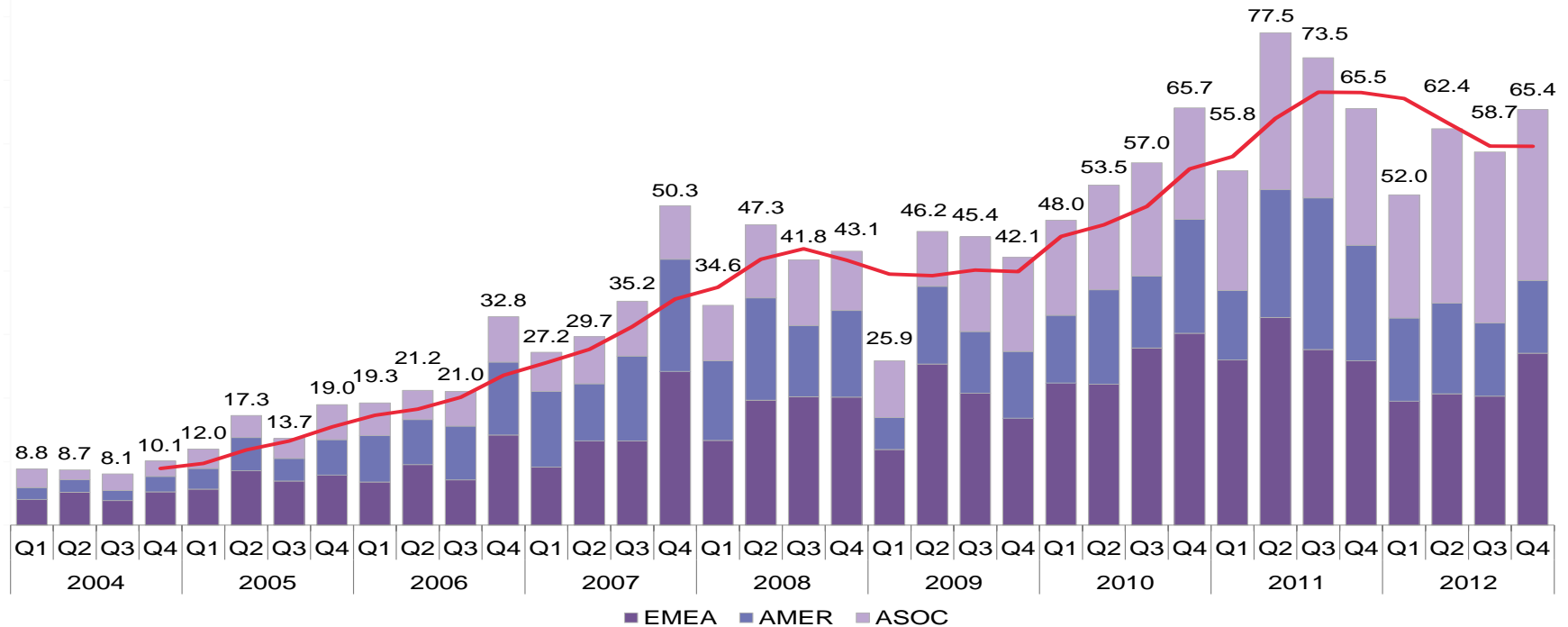


Note: Includes corporate and government R&D, and small distributed capacity. Adjusted for re-invested equity. Does not include proceeds from acquisition transactions

Source: Bloomberg New Energy Finance

NEW INVESTMENT IN CLEAN ENERGY BY REGION Q1 2004–Q4 2012 (\$BN)

- ASOC (Asia & Oceania) has taken a lead in investments & is expected to maintain this position in the near future. With a \$67.7bn outlay in 2012, China accounted for the majority of investments in ASOC and topped the country league tables with US coming in second at \$44.2bn.



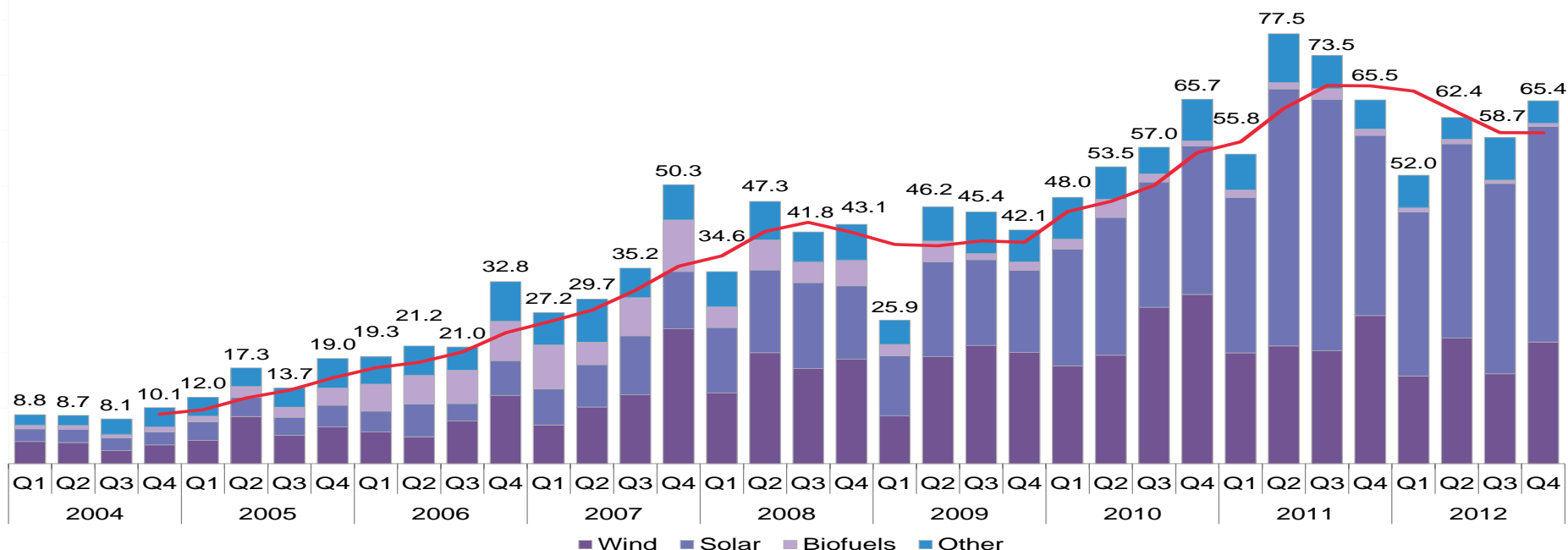
Note: Total values include estimates for undisclosed deals. Excludes corporate and government R&D. Includes small distributed capacity & adjustment for re-invested equity.

Source: Bloomberg New Energy Finance

NEW INVESTMENT IN CLEAN ENERGY BY SECTOR

Q1 2004–Q4 2012 (\$BN)

- Solar accounted for \$142.5bn in 2012, down 9% on its 2011 record but still >50% investments in the year. Wind saw investment of \$78.3bn, down 13% from 2011. The third-largest sector, energy-smart technologies such as smart grid, energy efficiency and electric vehicles, suffered a 7% drop to \$18.8bn.



Note: Total values include estimates for undisclosed deals. Excludes corporate and government R&D. Includes small distributed capacity & adjustment for re-invested equity.

Source: Bloomberg New Energy Finance

TOP 10 RECIPIENTS OF ASSET FINANCE INVESTMENT BY FUNDING ORIGIN, 2004 – H1 2012

- Foreign investment (including both debt and equity) in clean energy sectors of emerging economies remains lower than developed countries. Domestic investments in China, Brazil and India were over 80% during 2004 - H1 2012 period. Of the \$44.3bn deployed across borders in 2011 to build new renewables projects, it is estimated that just 13% (or \$5.8bn) was sourced from public funds. Strong domestic financing therefore is crucial for renewable deployment.

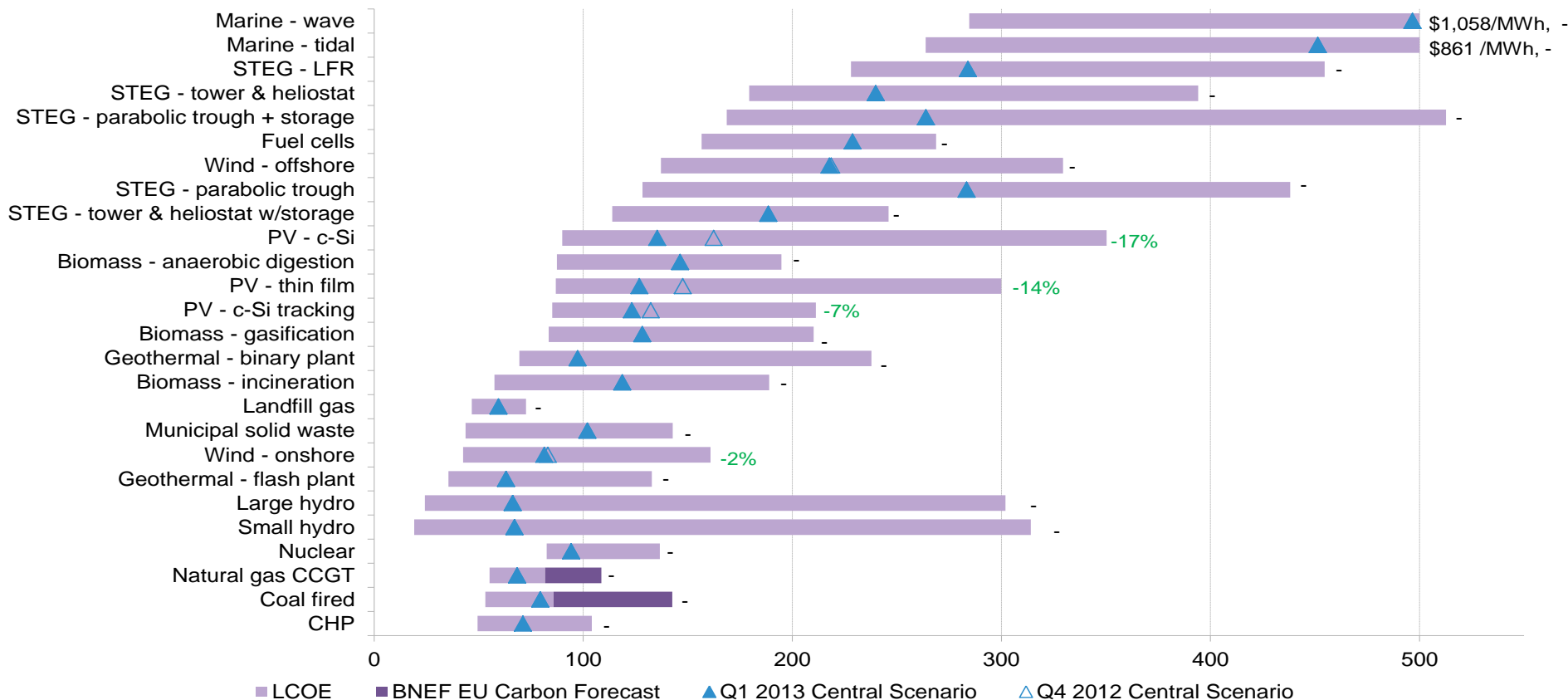
RANK	COUNTRY	(\$BN)	DOMESTIC	FOREIGN	UNKNOWN
1	China	191.1	94%	4%	2%
2	United States	171.1	60%	38%	2%
3	Spain	73.7	61%	32%	7%
4	Brazil	46.1	81%	18%	1%
5	India	44.4	82%	13%	6%
6	Germany	43.7	67%	22%	11%
7	United Kingdom	36.0	34%	64%	2%
8	Italy	28.6	46%	45%	9%
9	France	20.4	62%	32%	6%
10	Canada	19.3	57%	41%	2%

Note: new build asset finance for renewable energy projects only.

Source: Bloomberg New Energy Finance

GLOBAL RANGE FOR THE LEVELISED COST OF ELECTRICITY, Q1 2013 (\$/MWH)

- Hydro, geothermal and onshore wind have similar costs to conventional fuels while solar PV is rapidly decreasing.

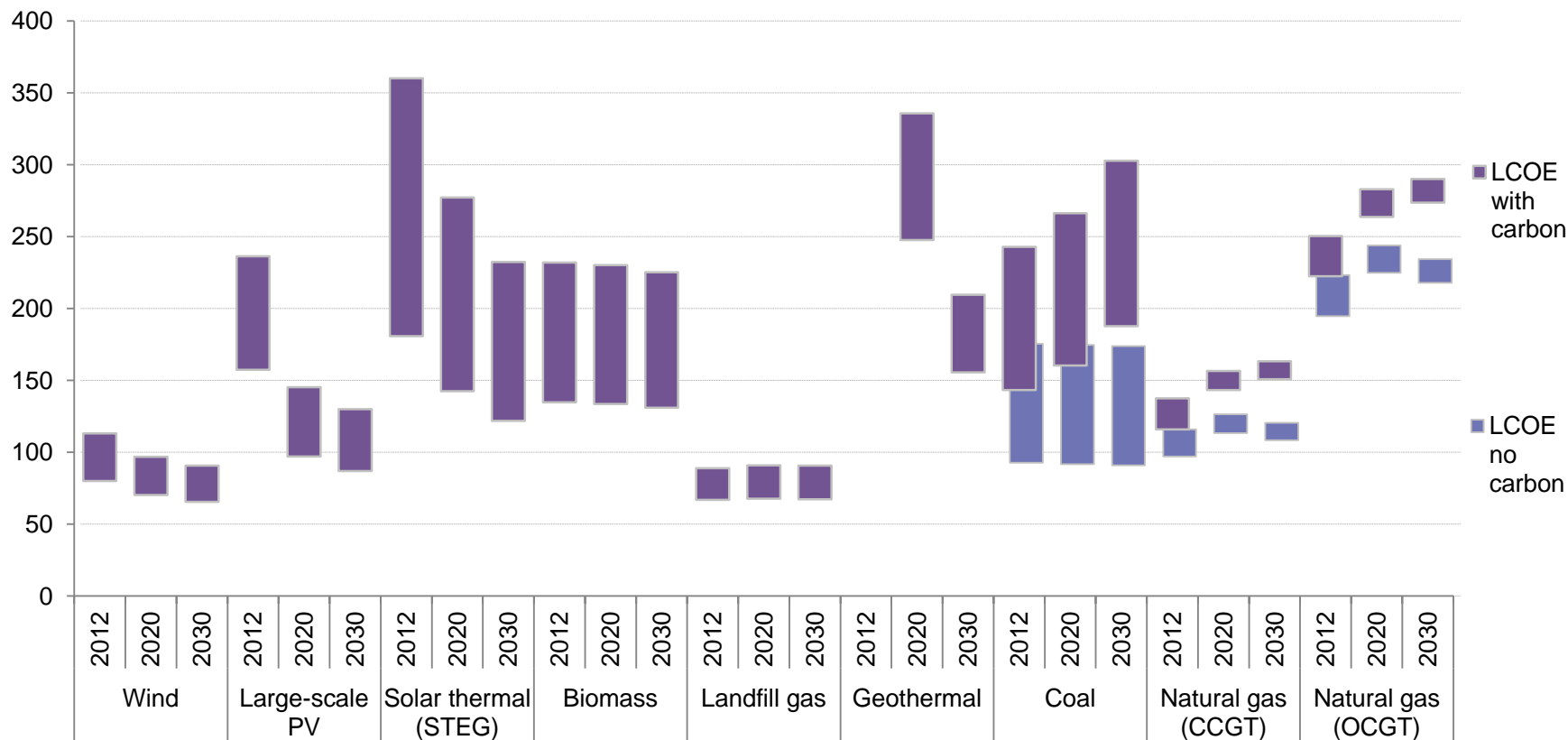


Note: Carbon forecasts from the Bloomberg New Energy Finance European Carbon Model with an average price to 2030 of \$48/mt. Coal and natural gas prices from the US EIA and BNEF. % change represents change from Q4 2012.

Source: Bloomberg New Energy Finance

2012-30 LEVELISED COST OF ENERGY IN AUSTRALIA (REAL 2012 AUD/MWH)

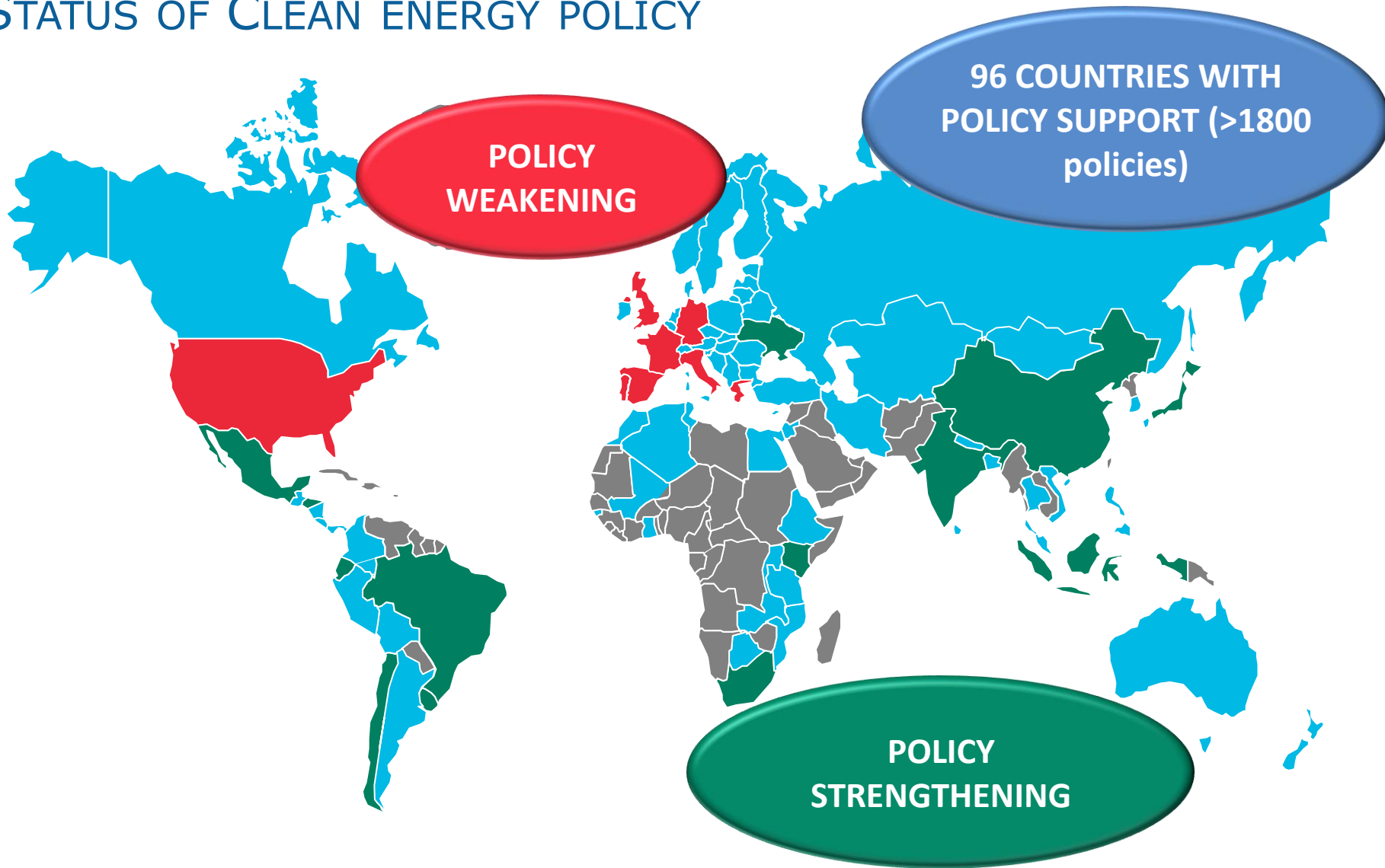
- Wind energy is now cheaper than *new-build* fossil fuel power generation in Australia – the world's second biggest exporter of thermal coal. This is particularly the case when the carbon price is incorporated in the costs.



Note: LCOE is the per MWh price for an inflation adjusted, fixed-price off-take agreement that, taking into account all project-specific costs, offers the sponsor (project owner) the minimum return necessary to undertake the project.

Source: Bloomberg New Energy Finance

STATUS OF CLEAN ENERGY POLICY



Source: Bloomberg New Energy Finance

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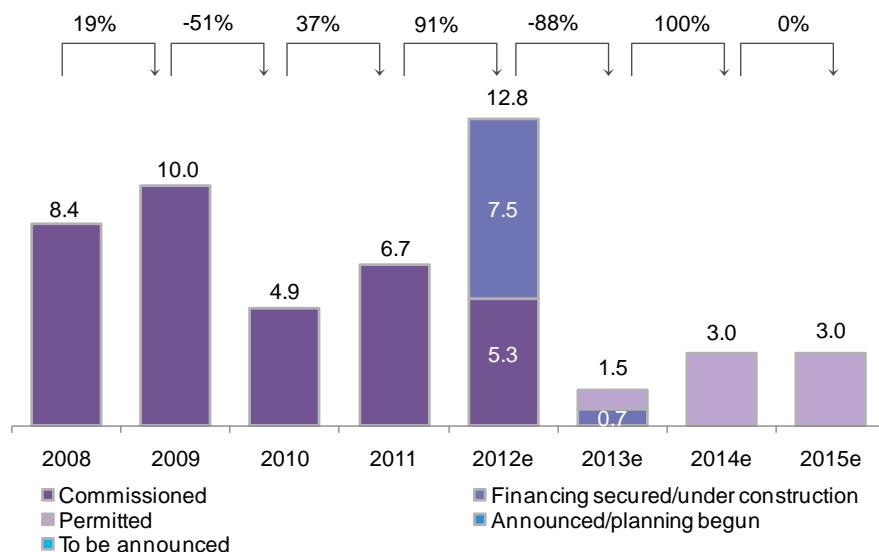
BARRIERS

- **Policy uncertainty:** the possibility of governments cutting back earlier-promised incentives or performing unannounced and infrequent reviews creates uncertainty on future cash inflows of projects.
- **Off-taker risk:** creditworthiness of government-owned utilities are a major cause of concern for investors in some countries.
- **Integrated planning:** when policy targets are set for specific sectors like wind or solar, integrated planning for anticipated issues like transmission system unavailability, grid instability and payment delays is sometimes not done and has significant consequences.
- **Grid availability:** in certain states/provinces of emerging markets grid curtailment is a growing concern, particularly where renewables are over 10% of installed generation capacity.
- **Access to low cost debt:** cost of debt has a major bearing on the levelised cost of energy generation from renewables and in countries with high interest rates, limiting their deployment.
- **Resource assessment:** Lack of proper resource assessment before a government agency initiates a tender or opens up a sector can lead developers and grid operators to perform incorrect estimations of how much renewable energy will be generated and fed into the grid.

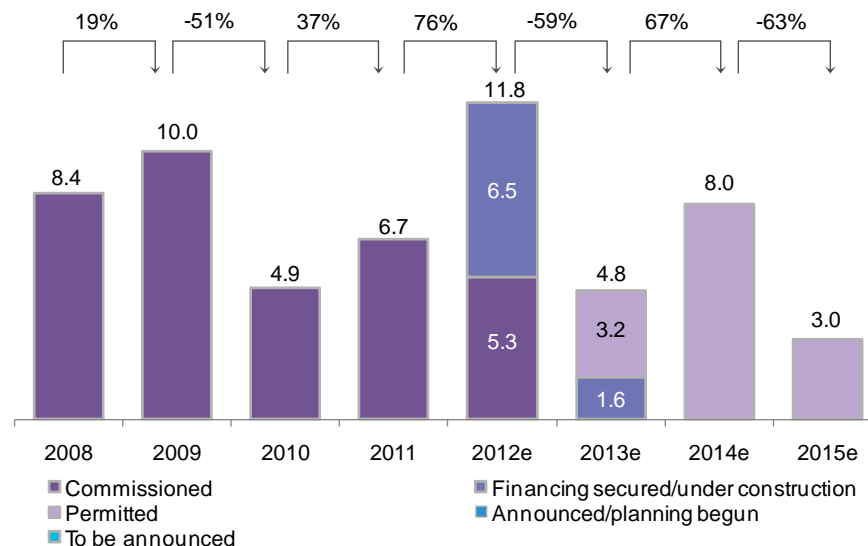
BARRIER: POLICY UNCERTAINTY

US WIND CAPACITY BY STATUS, 2008-15E (GW)

FORECAST IF PTC WAS NOT EXTENDED



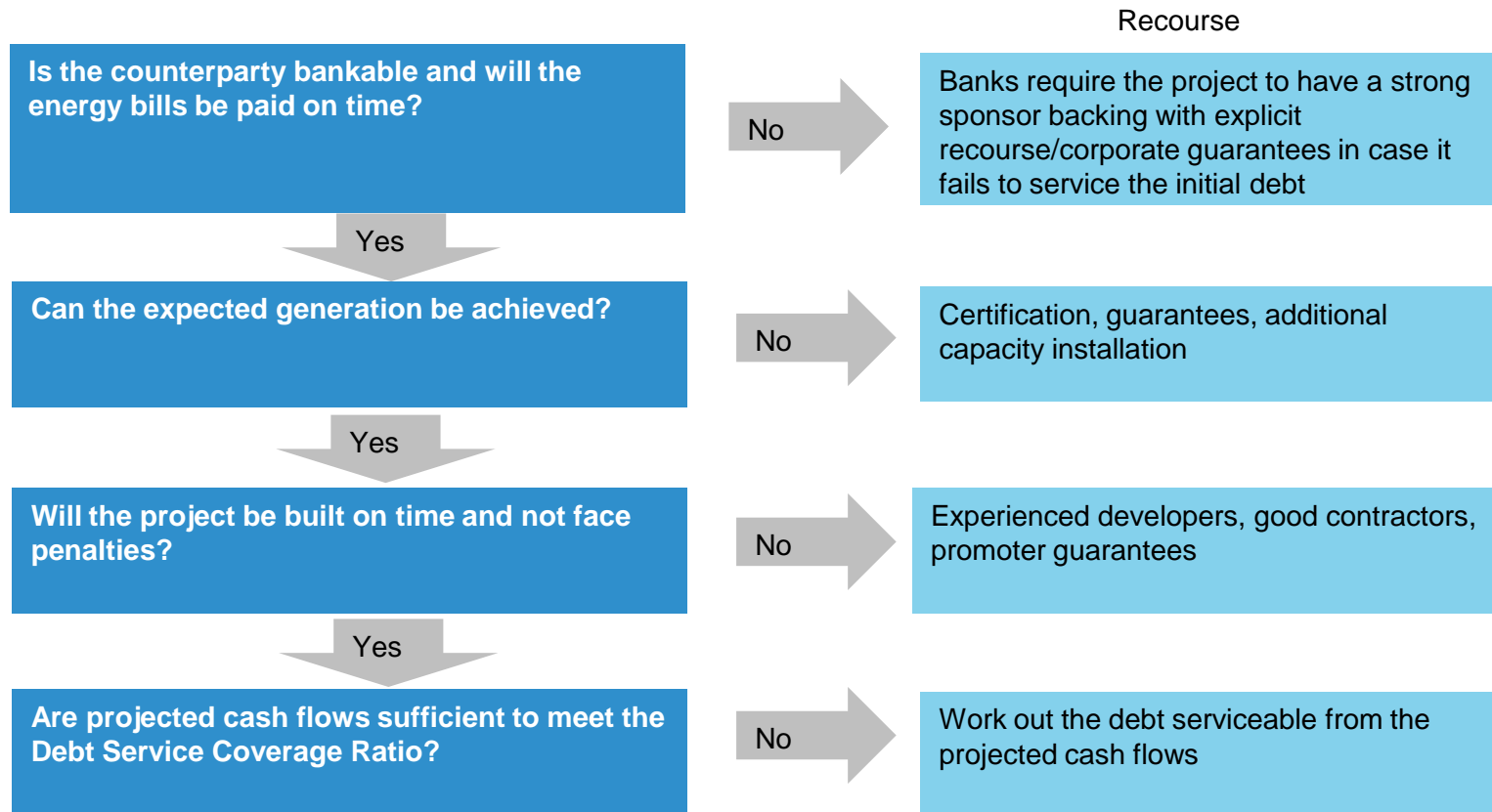
FORECAST AFTER PTC WAS EXTENDED



- Significantly lower wind installations over the next 3 years were anticipated if the production tax credit (PTC) had not been extended. Uncertainty not only impacts capacity installations but skews the commissioning dates - creating 'good' and 'bad' years for the industry. This underlines the importance of the certainty of incentives over the long-term to ensure the sustainable and constant growth of the renewable energy sector in the country.

BARRIER: PROJECT FINANCE RISK

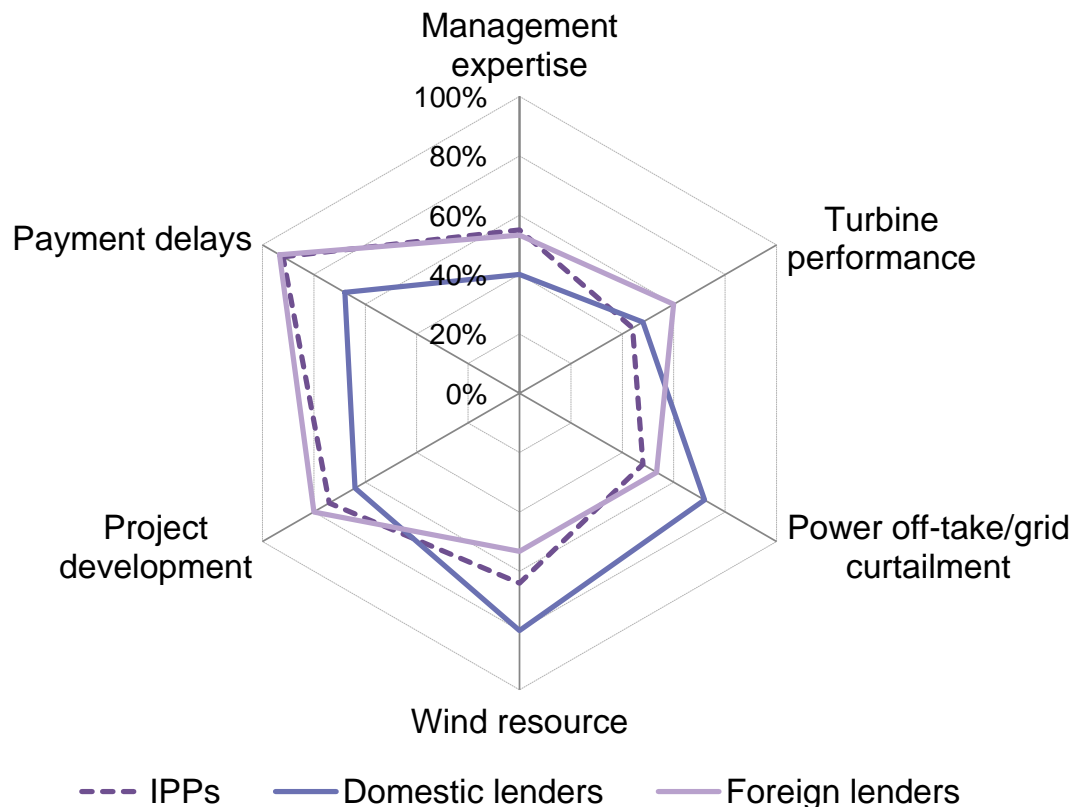
CAN THE PROJECT'S REVENUES MEET THE DEBT OBLIGATIONS?



- Pre-commissioning risks, off-taker risk and technology risk form key components of a debt provider's project appraisal and debt service capability calculations. Tools like recourse/guarantees from project owners, certifications from third-party agencies and replenishable debt service coverage accounts are used to mitigate some of these risks.

BARRIER ILLUSTRATION: RATING OF RISK FACTORS FOR INDIAN WIND PROJECTS

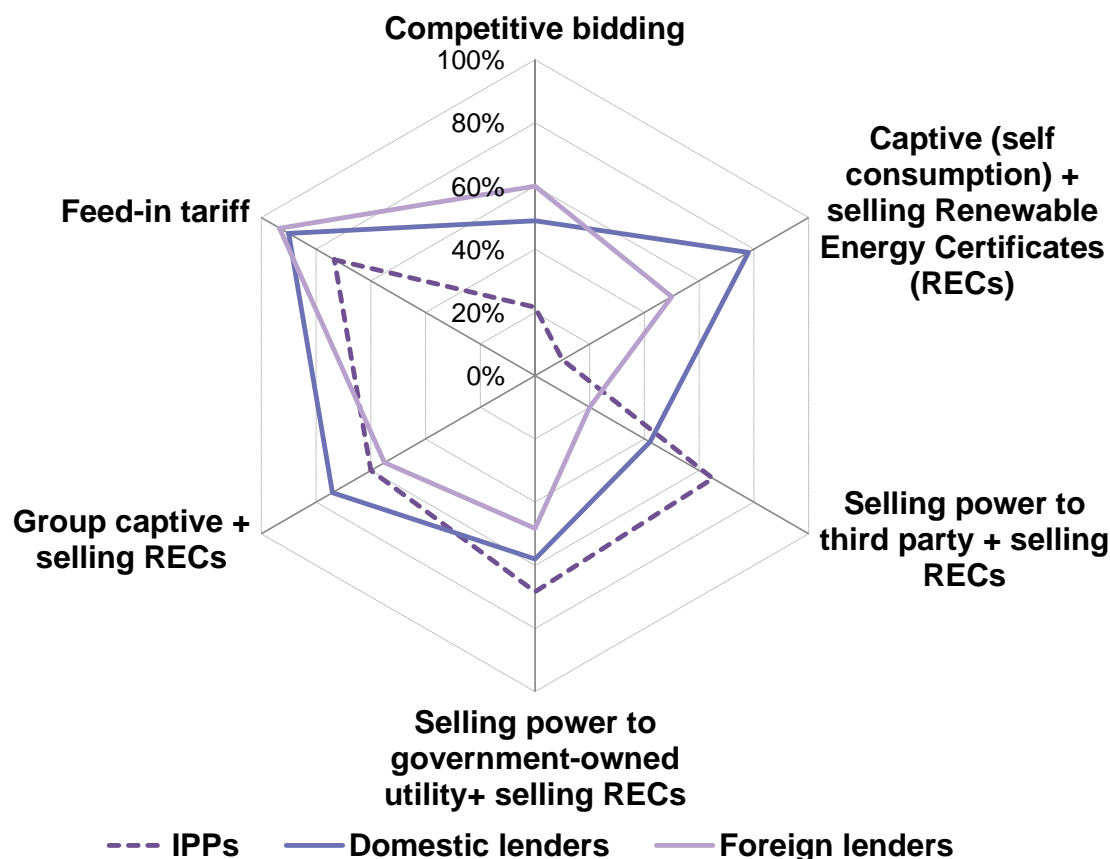
- Two places where policy can play a major role are reducing counterparty risk (including payment delays), particularly if a government utility is the power off-taker, and reducing grid curtailment risks.



Note: based on a survey done amongst 14 major market participants in India. Project development includes land acquisition, grid connection, engineering procurement and construction activities.

Source: Bloomberg New Energy Finance

BARRIER ILLUSTRATION: PREFERENCE FOR REVENUE STREAMS IN INDIAN WIND PROJECTS SHOWS WHAT LENDERS PERCEIVE AS LEAST RISKY



- Feed-in tariffs are usually preferred by most participants.
- Competitive bidding is one of the least preferred by developers but foreign lenders think that chances of renegotiation/retrospective cuts of rates are less in this case.

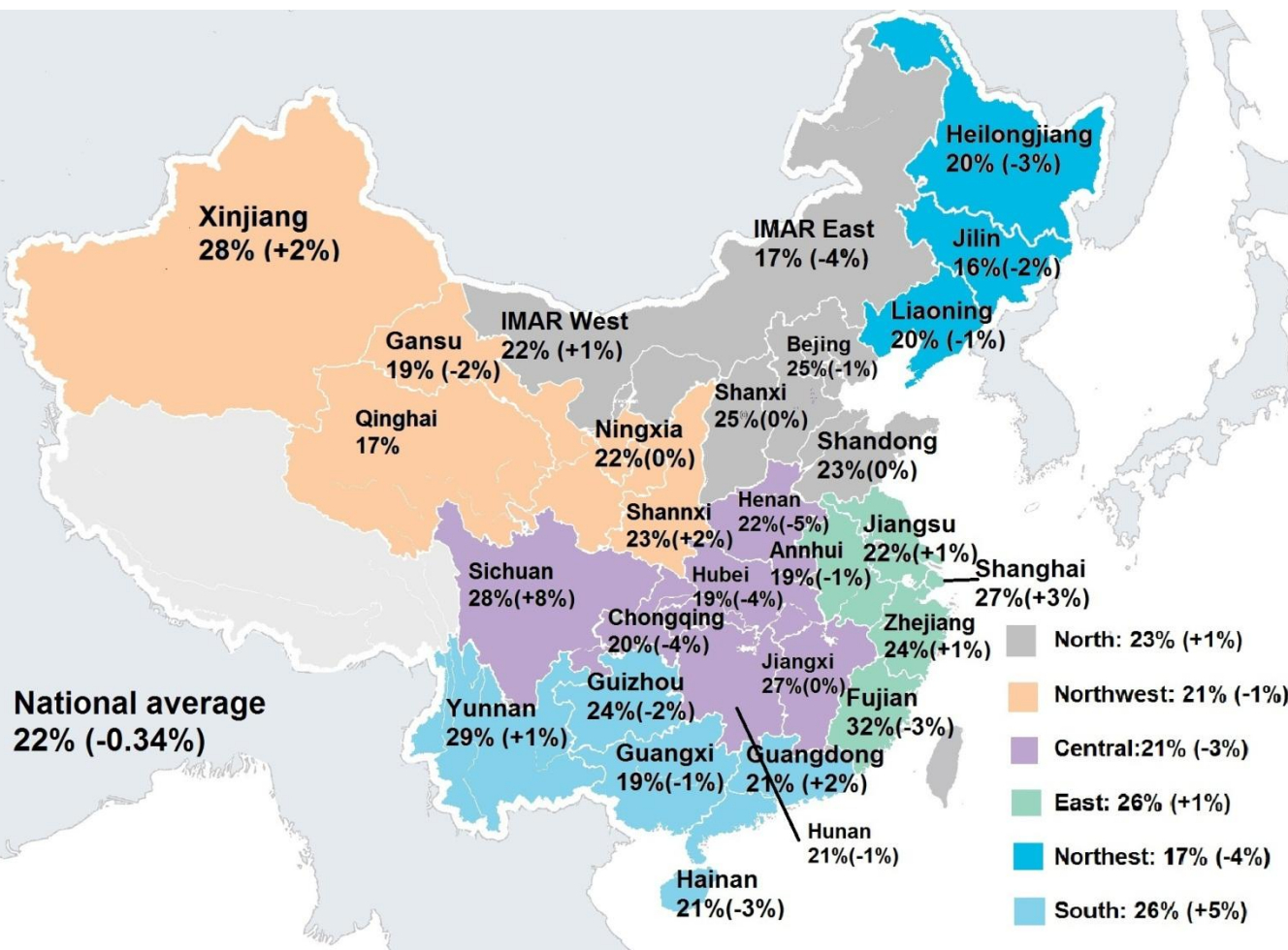
Note: based on a survey done amongst 14 major market participants in India

Source: Bloomberg New Energy Finance

BARRIER: INTEGRATED PLANNING AND GRID CURTAILMENT

ANNUAL CAPACITY FACTORS FOR CHINA WIND PROJECTS IN 2012 (%CHANGE FROM 2011)

Capacity factors have declined in many provinces, implying insufficient grid infrastructure and grid curtailment issues.

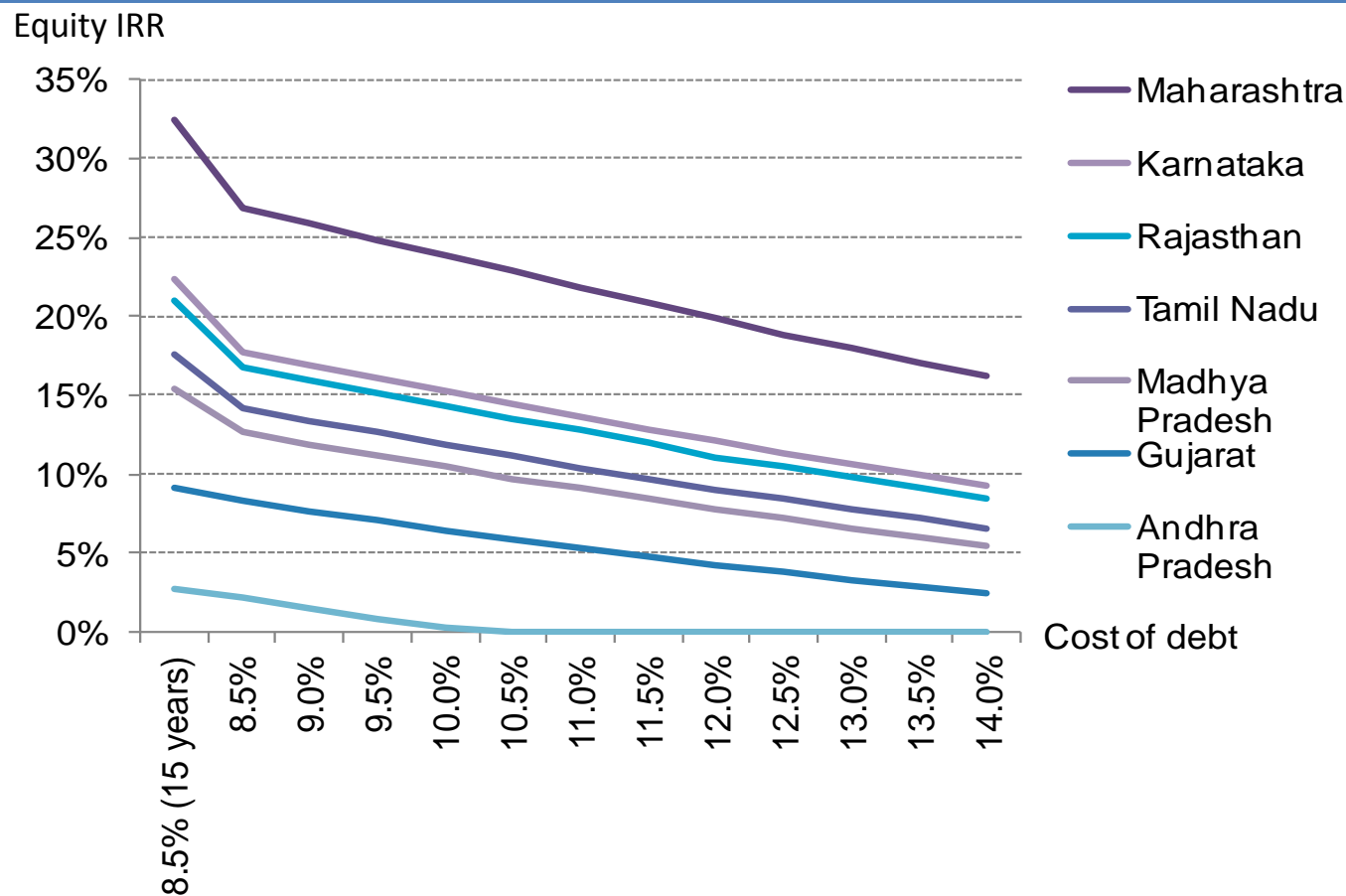


Source: National Energy Administration (NEA), Bloomberg New Energy Finance

BARRIER: ACCESS TO LOW COST DEBT

EQUITY IRR SENSITIVITY TO COST OF DEBT FOR INDIAN WIND

- If debt rate falls from 12% to 10%, the average increase in IRRs across India would be 300 basis points.



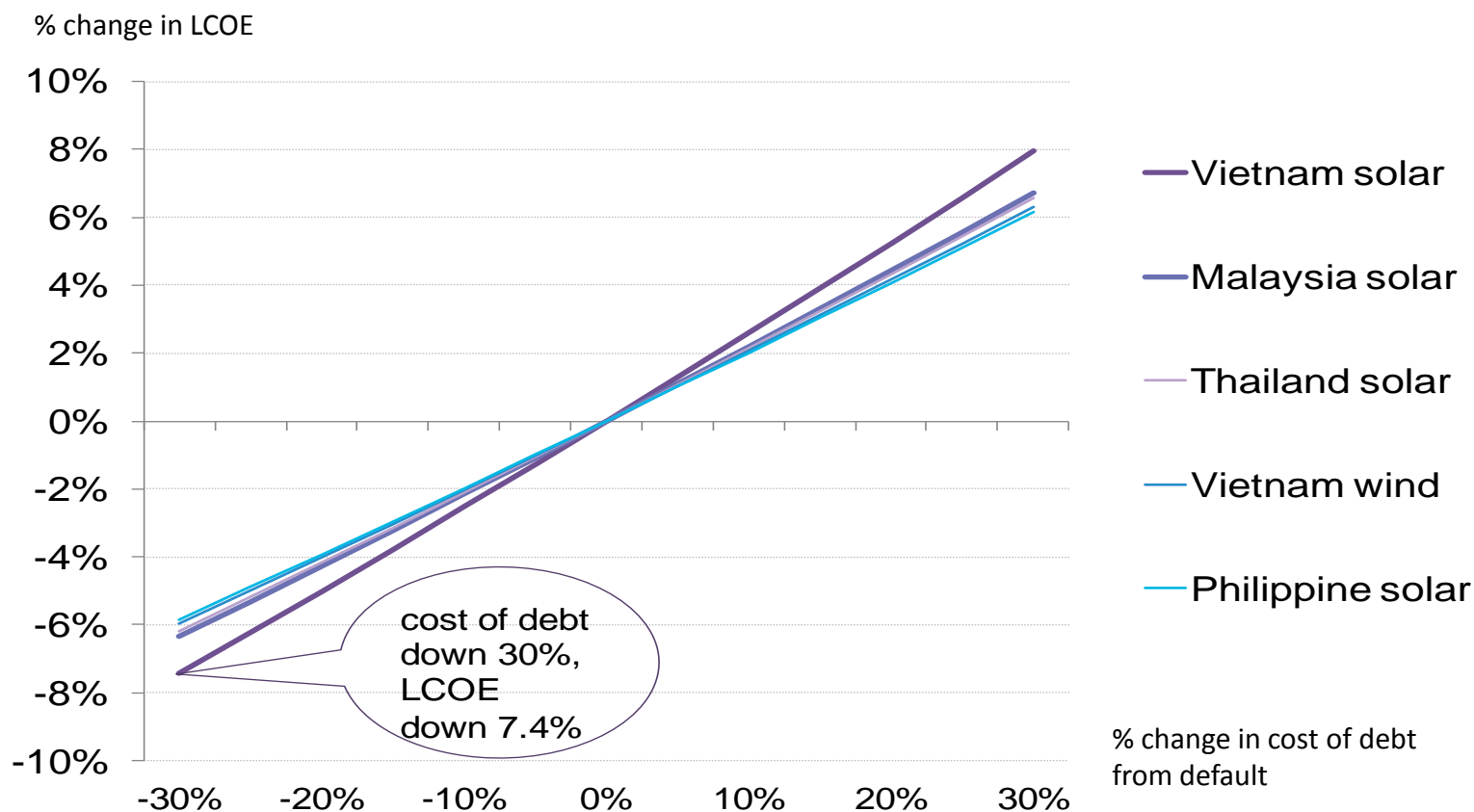
Note: 8.5% (15 years) implies we have used tenure of 15 years in this case unlike 12 years in all other scenarios. Calculations based on tariffs applicable in June 2012.

Source: Bloomberg New Energy Finance

BARRIER: ACCESS TO LOW COST DEBT

LCOE SENSITIVITY TO COST OF DEBT IN SOUTHEAST ASIA

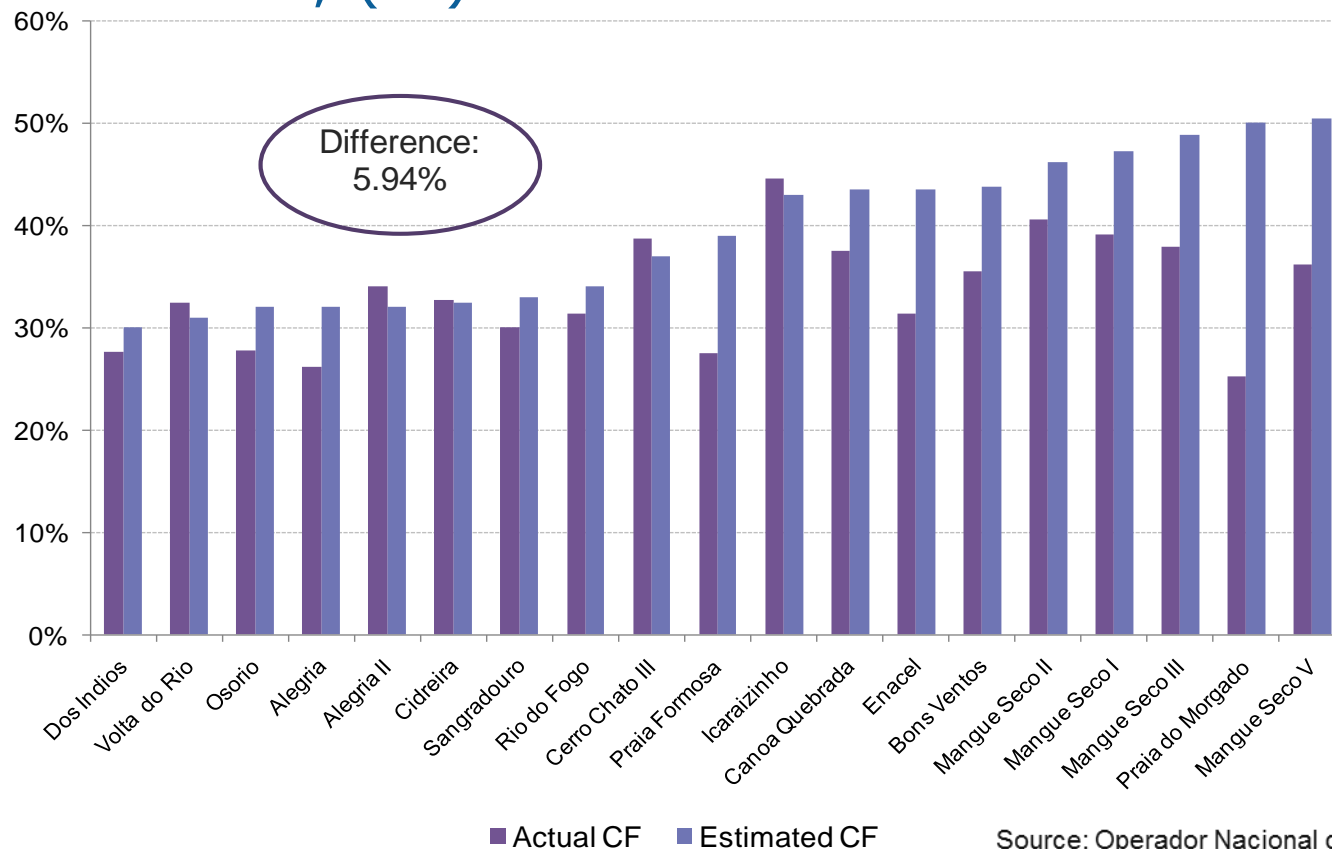
- Low cost debt can significantly reduce the levelised cost of energy generation from renewable energy technologies, which can in turn lead to increased capacity build-out and lower tariffs for consumers.



Source: Bloomberg New Energy Finance

BARRIER: RESOURCE ASSESSMENT

ACTUAL AND EXPECTED CAPACITY FACTORS FOR BRAZILIAN WIND PROJECTS 2008-12, (%)



Source: Operador Nacional do Sistema Elctrico (ONS)

- Lack of proper resource assessments before a government agency initiates a tender or opens up a sector can lead developers and grid operators to perform incorrect estimations of how much renewable energy will be generated and fed into the grid.

BARRIER: IMPACT OF REGULATIONS IN FINANCIAL MARKETS ON CLEAN ENERGY

BASEL III RULES

Upcoming **Basel III rules** significantly limit the ability of banks to provide long-term, **nonrecourse project finance**. While this affects the availability of capital for all infrastructure projects, wind and solar projects are particularly vulnerable because they involve high upfront capital costs, offset by lower operating costs.

SOLVENCY II REGULATIONS

Solvency II regulations governing the need for **insurance companies** to hold capital in supposedly liquid and/or low-risk instruments like public equities and government bonds will reduce their appetite for long-term investments for which there is no public market, even though such investments have well-understood yield characteristics and a well-developed private market.

PENSION FUNDS

Pension funds are important potential investors in clean energy projects, but rules on the matching of assets and liabilities tend to push trustees towards taking a highly conservative approach to asset allocation. In addition, (as in the case of the UK at least,) rules for calculating Pension Protection Fund fees can penalise infrastructure investment in general.

PENSION FUNDS

Laws governing the fiduciary duties of pension fund trustees have been interpreted as directing pension funds to adopt a narrow focus on risk-adjusted returns. In particular, no account is generally taken of the risk of write-downs to the value of fossil fuel assets if future action on climate change renders them stranded.

RATING AGENCIES

Rating methodologies focus on near-term quantifiable risks rather than either catastrophic one-of-a-kind events or longer-term systemic risks. The dependence on ratings agencies also acts as a particular barrier to cross-border investment in the developing world, where few countries and even fewer utilities are rated as investment-grade.

PUBLIC SECTOR ACCOUNTING RULES

Accounting rules can influence the choice and level of incentive mechanisms available to policy makers for clean energy. For example, liabilities associated with feed-in tariffs may be included in tax or spending totals, even though the cost will in fact be borne by electricity consumers. This puts pressure on treasury departments to limit support for clean energy.

Note: see BNEF white paper <http://about.bnef.com/white-papers/financial-regulation-biased-against-clean-energy-and-green-infrastructure/>

OUTLINE

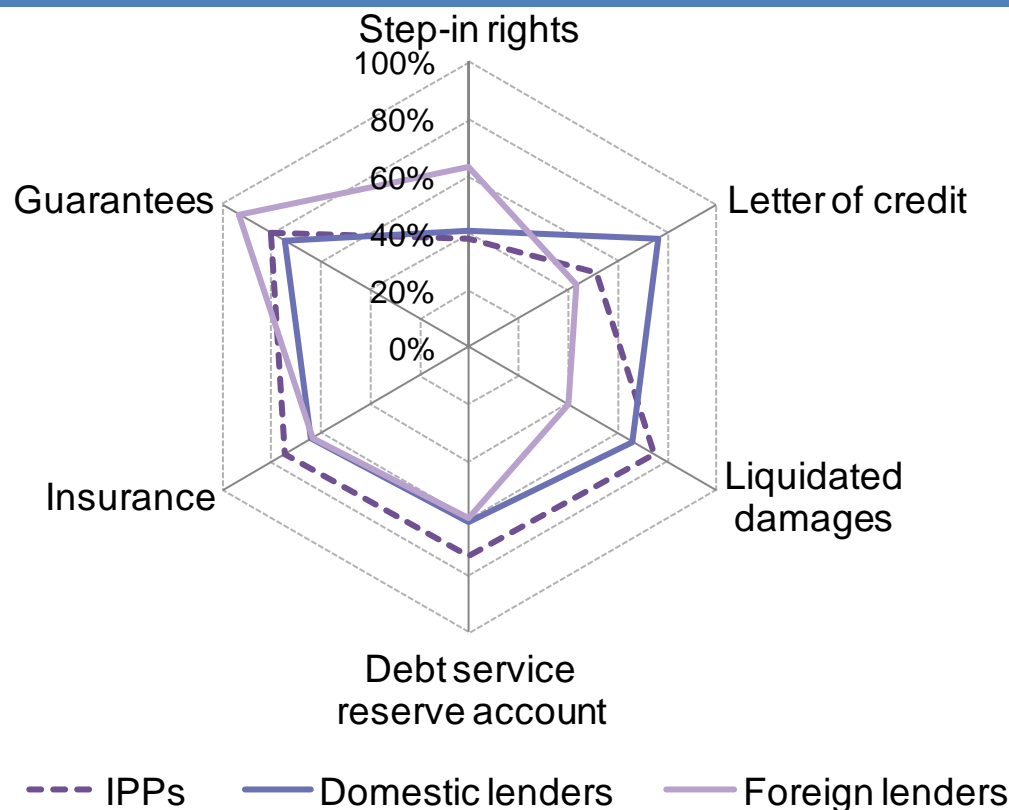
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IMPROVING POLICIES WITH BUILT-IN FLEXIBILITY

- **Flexibility in feed-in tariffs for commissioned projects (FiTs):**
 - In some countries retrospective tariff cuts were done on commissioned projects due to economic downturn.
 - Regulators could either pre-define frequency of tariff review for commissioned projects or have a front-loaded tariff.
- **Well-balanced and pre-defined frequency of tariff reviews for capacity to be built:**
 - Regular tariff reviews can ensure that tariffs and costs are in sync and can take care of issues like rises in interest rates or capital costs.
 - On the flip-side, too frequent tariff reviews can cause uncertainty in the markets.
 - Irregular tariff reviews with no pre-defined frequency can cause major disruptions in investments flows and capacity installations.
- **Alternatives to FiTs:**
 - Many countries are now opting for bidding as an alternative to FiTs with safeguards like penalties for delays in commissioning to ensure most of the committed capacity is built.

OVERCOMING RISK ILLUSTRATION: PREFERRED RISK MITIGATION TECHNIQUES FOR INDIAN WIND PROJECTS

- Loan guarantees: despite criticism, they have remained an effective tool to promote deployment of new technologies and scale-up of old ones in both developed and developing countries where off-taker risk is high.
- Insurance: enabling better structured and lower cost insurance products could be a key in some countries.

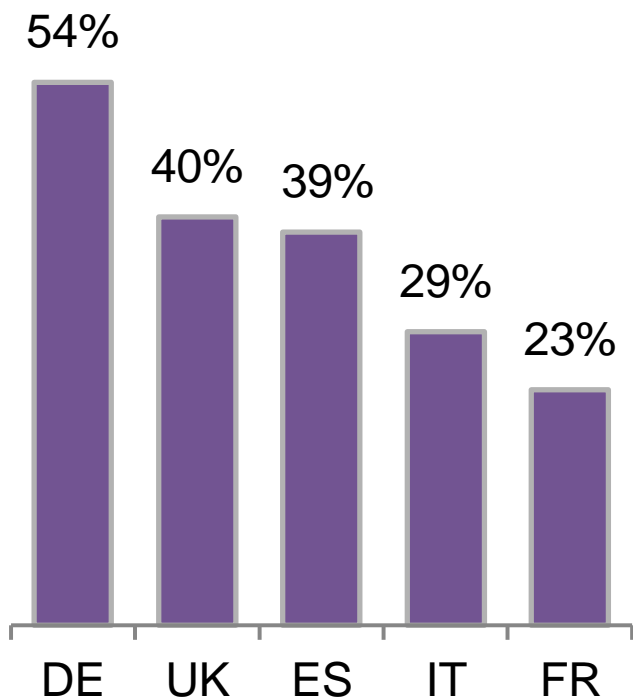


Note: based on a survey done amongst 14 major market participants in India

Source: Bloomberg New Energy Finance

INTEGRATED PLANNING AND SOLUTIONS TO REDUCE GRID CURTAILMENT: DO YOUR HOMEWORK

FORECASTED EUROPEAN RENEWABLE ENERGY PENETRATION IN 2020 (% OF INSTALLED GENERATION CAPACITY)



Note: Select countries only: DE- Germany, UK- United Kingdom, ES- Spain, FR- France, IT- Italy. Wind and solar only, excludes hydro, biomass, waste to energy, marine and tidal generation.

•In addition to knowing the forecast for RE penetration, project developers should investigate distributed generation integration challenges:

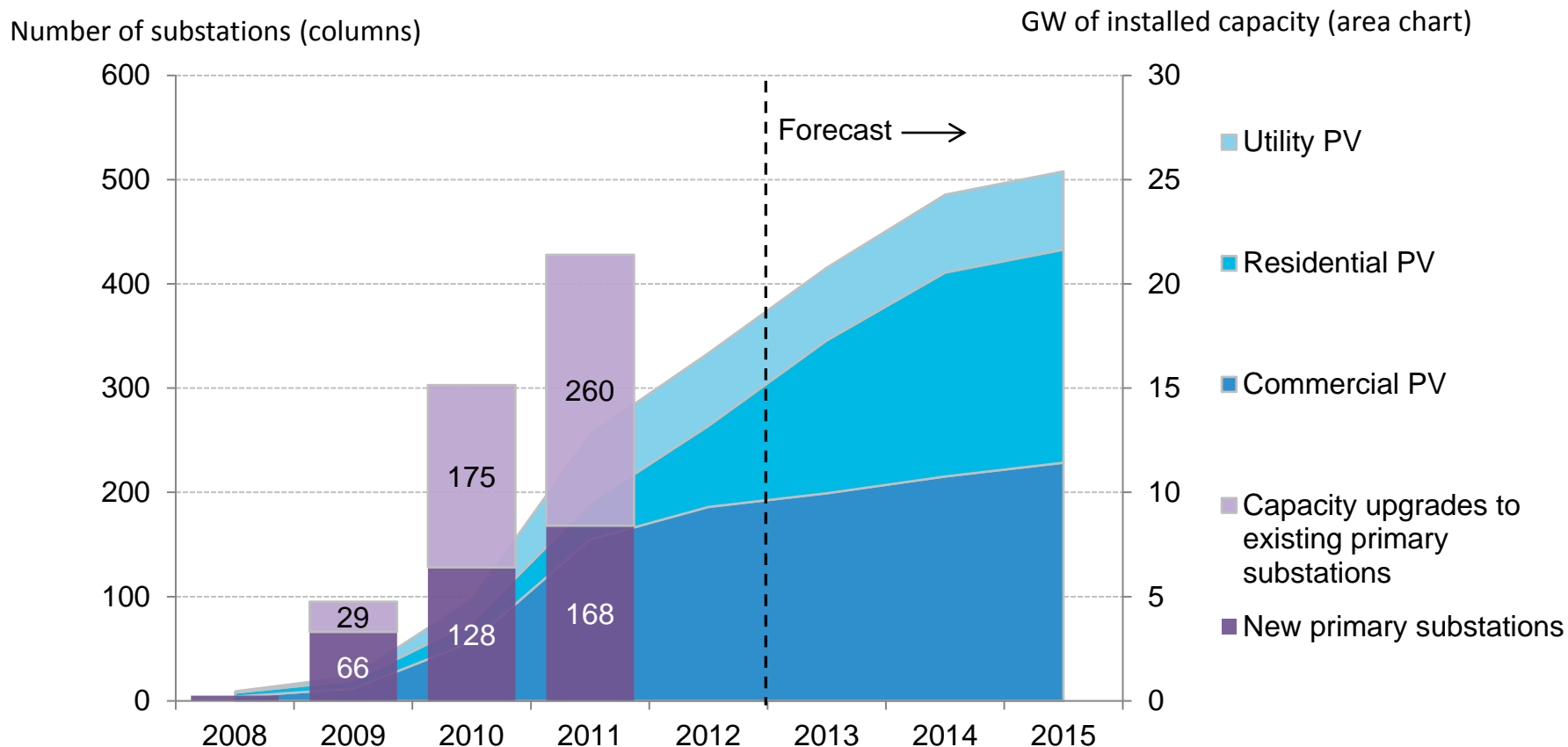
- Voltage rise/drop and power quality issues
- Reverse power flows
- Fault management
- Network capacity constraints

•Familiarity with these factors will allow investors and developers to consider supporting development of potential technology solutions, such as:

- Asset monitoring
- Real-time state estimation
- Network configuration
- Increased communication between transmission and distribution network operators

Source: Bloomberg New Energy Finance

INTEGRATED PLANNING ILLUSTRATION: ITALIAN INCENTIVES TO DEVELOP INFRASTRUCTURE FOR PROJECTED PV CAPACITY, 2008-15E



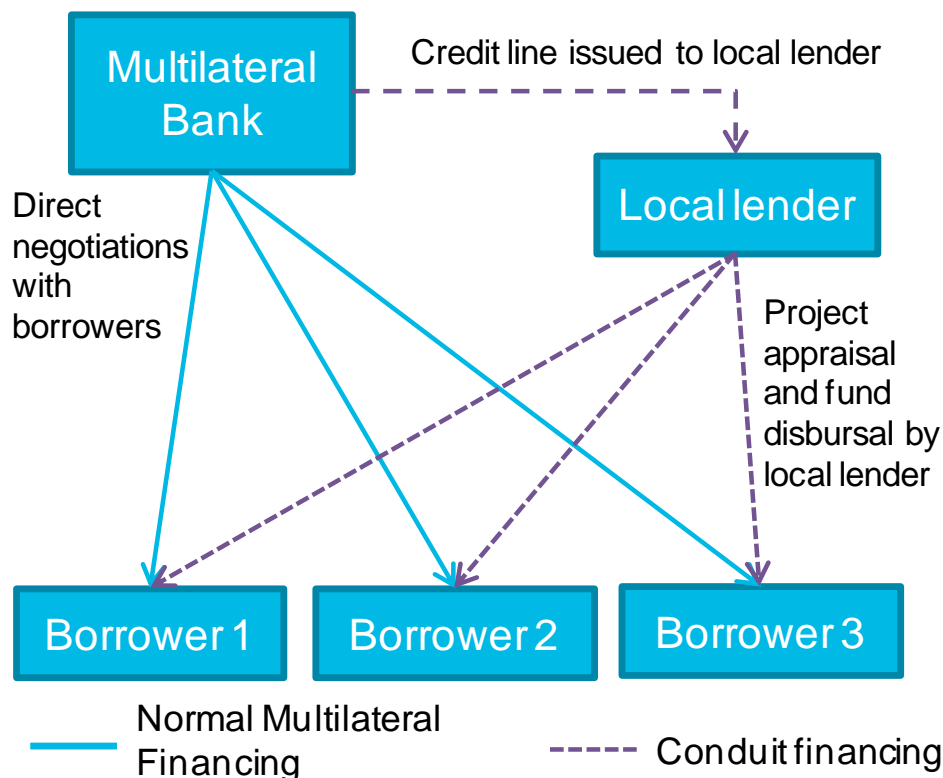
- Voltage fluctuations and reverse power flows experienced with increasing solar penetration.
- To address the challenge, the Italian regulator, AEEG, introduced a programme for distribution network operators to recoup and additional 2% rate of return on investment in smart grid projects.

INCREASING ACCESS TO DOMESTIC LOW COST DEBT: EXAMPLES OF PROVISIONS BY GOVERNMENTS

- **India:** the Indian Finance Minister announced in his budget speech of 28 February 2013 that low cost debt will be provided to renewable energy projects through the government-owned Indian Renewable Energy Development Agency. Details on the amount of available debt have not yet been released.
- **Thailand:** revolving fund of \$125m for 2008-11 – up to \$1.6m/project, less than 4% interest rate with maximum 7 year repayment.
- **Malaysia:** Green Technology Financing Scheme of \$472m. Government bears two-fifths of the 5% commercial bank rate and provides guarantee of 60% of loan amount.
- **Vietnam:** projects can obtain 70% of investment cost from Vietnam Development Bank.

RAMPING-UP LOW COST LENDING FROM MULTILATERAL AND NATIONAL DEVELOPMENT BANKS

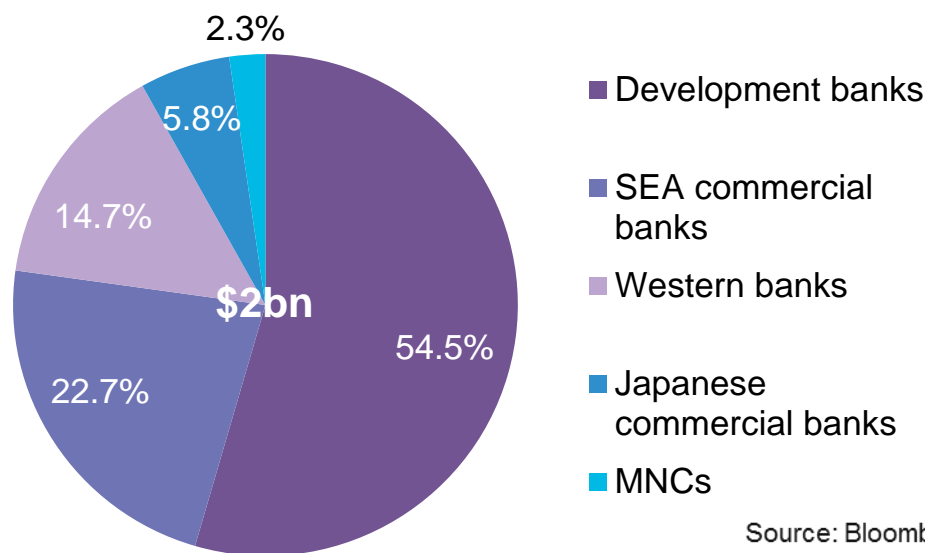
REDUCING COUNTRY RISK AND TRANSACTION COSTS USING CONDUIT FINANCING



- During 2007-11, **development banks** provided \$269bn of funds to the clean energy (including large hydro & energy efficiency) and the transmission and distribution sectors.
- **Conduit financing** has seen increasing activity. For example, Indian banks raised over \$900m in credit lines and loan facilities from multilaterals in 2012.
- Conduit financing reduces country risk for foreign lenders.
- Local lenders usually incur lesser transaction costs in appraising projects.
- Large domestic lenders are able to reduce currency hedging costs rather than individual project developers.

RAMPING-UP LOW COST LENDING FROM MULTILATERAL AND NATIONAL DEVELOPMENT BANKS IN THAILAND

- Development banks along with local foreign lenders have played a significant part in clean energy deployment in Southeast Asia. This has been primarily because they are able to provide low cost of debt, either because they can do concessional loans or can borrow cheaply on international markets (ie, development banks) or because their country risk premium is lower (ie, local commercial banks).
- As a sector grows, the experience and expertise of local commercial banks increases. This in turn allows for more financing from this source, reducing the reliance on development bank funding. This has been seen clearly in the case of Thailand. Hence, capacity building for the local banking sector is crucial for rapid renewable energy growth.



GOVERNMENT INITIATED RESOURCE ASSESSMENT

SOLUTION: EGYPTIAN EXAMPLE

- In 1986 the Egyptian New & Renewable Energy Authority (NREA) was established to act as the national focal point for expanding efforts to develop and introduce renewable energy technologies.
 - In 1987, an annual potential wind map for Egypt was published in collaboration with USAID.
 - in 1996, NREA together with the Risø National Laboratory (Risø) in Denmark developed a Wind Atlas for four sites on the West Coast of the Suez Gulf. In 2003, a detailed Wind Atlas for these same areas were published.
 - In 2005 the NREA, the Egyptian Meteorological Authority (EMA) and Risø expanded the Atlas to cover the whole of Egypt. The Danish contribution to this Egyptian-Danish project was funded by the Danish Ministry of Foreign Affairs through Danida. The Danish Government allocated a grant of DKK 9 million (about USD 1.5 million).
 - Using the Atlas outcomes, the Ministry of Electricity and Energy formulated a wind energy strategy up to the year 2020.
 - A direct impact of the Wind Atlas of Egypt was the allocation, according to three Presidential Decrees, of more than 7600 km² of desert lands to NREA, allowing them to host public and private wind farms.

Source: International Renewable Energy Agency, New and Renewable Energy Authority-Egypt

TAPPING GLOBAL FINANCIAL MARKETS FOR INCREASED CLEAN ENERGY INVESTMENTS

- The past decade has seen **investment in clean energy** grow from less than \$50bn per annum to over \$250bn per annum. However, for energy-related carbon emissions to peak by 2020 and then decline, this figure will need to more than double.
- **Infrastructure investment** only accounts for around 1% of the asset allocation of the average pension fund, and specifically green infrastructure accounts for around 3% of that – a tiny proportion of assets available worldwide for investment.

GLOBAL CAPITAL MARKET SIZES IN PERSPECTIVE (\$BN)



Note: see Bloomberg New Energy Finance white paper
<http://about.bnef.com/white-papers/financial-regulation-biased-against-clean-energy-and-green-infrastructure/>

Source: Bloomberg New Energy Finance

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OPPORTUNITIES FOR PROGRESS (1): INTERNATIONAL COLLABORATION

- **Sharing of policy best practices.** Governments play an important role in establishing long-term and flexible support structures to incentivise the deployment of renewable technologies. Organizing resources, increasing data availability, and developing analysis tools will accelerate the use of best practices.
- **Engaging in Public-Private Networks and Forums.** In the development of policies, consultations with the private sector and industry is key. Coordinating with the private sector will enrich the research and tools available to key decision makers.

OPPORTUNITIES FOR PROGRESS (2): CAPACITY BUILDING

- Local commercial banks have the potential to significantly increase access to low-cost debt.
- Expanding the capacity of local commercial banks through training programs is key.

Examples of ways to increase capacity

- Increased learning from multilateral development banks
- Increased engagement in online and in-person training programs (e.g., through the Clean Energy Solutions Center www.cleanenergysolutions.org)
- Creation of finance policy universities or intensive trainings for key decision makers.

OPPORTUNITIES FOR PROGRESS (3): DISCUSSION OF NEW FOCAL AREAS

- **Financial regulations** affect investment flows from Global Financial markets into clean energy.
- **Increased research and discussion** the regulation of investments, in addition to the policy relating to underlying assets, companies or technologies, is needed as these regulations may be holding back the flow of investment
- These areas include:
 - Pension Funds
 - Public Sector Accounting rules
 - Rating agencies
 - Basel III rules

CONTACT INFORMATION

U.S. Department of Energy
Christie Ulman
Christie.Ulman@hq.doe.gov

U.S. Department of Energy
Matthew Wittenstein
Matthew.Wittenstein@hq.doe.gov

Bloomberg New Energy Finance
Ashish Sethia
asethia5@bloomberg.net

Bloomberg New Energy Finance
Shantanu Jaiswal
sjaiswal9@bloomberg.net

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APPENDIX

DIFFERENT TYPES OF OPERATING RISK IN SOLAR PROJECTS (1)

Category	Risk Type	Risks
Financial	Revenue/political	Off-taker creditworthiness Change of law / political Tax increases Market price for electricity Sovereign liquidity/solvency
	Operating costs	Costs escalate faster than forecast; parts fail faster than forecast expected Local municipality permitting "hold-up" Insurance cost escalation
	Financing costs	Change in creditworthiness of off-taker or contractors Interest rate increase on un-hedged debt
Performance	Insolation	Sun shines less than forecast ("bad patch") Local microclimate (database inaccuracy) Climate change (more storms; snow in Rome)
	Performance/Efficiency	Accelerated panel degradation Panel / string mismatch amplifies plant-wide degradation Higher auxiliary loads (eg: inverter heating & cooling) Inverter efficiency underperformance Higher wire losses (compromised insulation / hidden sinks) Accelerated soiling / increased panel washing costs
	Internal availability	More plant outages than forecast, material theft (eg: copper cables)
	External availability	Grid operator curtailment (low demand / transmission cap) Local grid instability triggered outages
	Maintenance contractor	Incentive misalignment: owner (long-term) vs. contractor (short-term) Long-term solvency Liquidated Damages must be adequate (high enough) so to incentivise the O&M contractor keeping the PV plant performing Adequacy of budget over long-term (loss-leader / solvency)

DIFFERENT TYPES OF OPERATING RISK IN SOLAR PROJECTS (2)

Category	Risk Type	Risks
Long-Term & Technology Risks	EPC warranty	EPC contractor solvency; warranty enforcement after base period EPC incentive mis-alignment (avoid costs vs. fast resolution)
	Manufacturer's warranty (generic issues)	Warranty enforceability (especially for Asian manufacturers) Does firm have other product lines to hedge market risk? Long term trend of consolidation - ok if via mergers, bad if through bankruptcy
	Panel specific	Accelerated panel degradation: Inadequate track record, or manufacturing defect Tough to see or prove without long term data;
	Inverter specific	Availability of replacement parts or qualified service personnel over long-term, if firm fails
	High capex & long lifetime (forecast accuracy risk)	The biggest risk is probably the long lifetime and payback period of a PV plant <ul style="list-style-type: none"> • Even minor uncertainty in forecasting how each of these factors will fare over a 30+ year plant life becomes significant • Since the vast majority of the ongoing cost of a PV plant, is the return on capital invested upfront, options are limited to "fixing" issues after a plant is built.
	Re-permitting	With costs-to-performance ratio dropping so quickly, repowering a plant is a potential mitigant to many risks. <ul style="list-style-type: none"> • This may make economic sense sooner than anticipated. • However, FIT / PPA may not be transferable, and risks exist of a change in local acceptance of PV

DEFINITIONS

- **Step-in rights:** are clauses in the loan contract that allows the lender to take control of business operations if the current owner is not able to run the business as desired.
- **Letter of credit:** is a letter from a bank guaranteeing payments to an equipment manufacturer or a lender if the project owner fails to make timely payments.
- **Liquidated damages:** are contracts that assign a predetermined penalty if there are delays or breach of a contract.
- **Debt service reserve account:** is an escrow account created by the project owner from which banks can recover interest payments in lean months when the receivables in that month alone are not sufficient to meet the debt service coverage ratio.
- **Guarantees:** includes all guarantees given by the project owner or the corporate entity for time bound and complete repayment of loan.