



## ICRA Rating Feature

# Rating Methodology for Solar Power Producers

This rating methodology describes ICRA's approach towards assessing the credit risk of solar power producers. It aims to help issuers, investors and other interested market participants understand ICRA's approach to analysing risks that are likely to affect the rating outcomes of the companies in the solar energy sector. This rating methodology updates and supersedes ICRA's earlier methodology note on the sector, published in June 2017. While this revised version incorporates a few modifications, ICRA's overall approach to rating entities in the sector remains materially similar.

## Overview

The all-India solar energy-based capacity installations have grown considerably to 28,181 MW as on March 31, 2019 from 10 MW as on March 2010. The share of solar energy-based capacity within the renewable energy (RE) segment in India has improved considerably to 36.3% as on March 31, 2019 from negligible levels as on March 31, 2010. The share of the solar energy-based capacity within the overall installed power generation capacity in India stood at 7.9% as on March 31, 2019.

The growth in the solar energy sector has been driven by strong policy support both by the Government of India (GoI) under its National Solar Mission and by several states through state-specific solar energy policies, regulatory support in the form of renewable purchase obligation (RPO) norms and significant improvement in cost competitiveness of solar energy. The Jawaharlal Nehru National Solar Mission (JNNSM) was launched in January 2010 by the Government of India (GoI) with the target of achieving 22 GW of solar capacity by FY2022, which included 20 GW of grid connected solar power-based capacity (including rooftop) and 2 GW of off-grid solar applications. In June 2015, the Union Cabinet approved the upward revision in the target for solar capacity additions planned by five times to 100 GW by FY2022. The targeted cumulative capacity by FY2022 comprises 40 GW grid-connected rooftop-based projects and 60 GW large- and medium-scale grid connected projects. In line with the capacity target, the Ministry of Power revised the solar RPO target to 10.5% by FY2022 from 8.0% earlier. Besides, many states have launched state-specific solar policies to support the growth of solar installations.

For development of large and medium grid connected solar capacity, the GoI provided support in two modes, i.e. mechanism of bundling<sup>1</sup> of solar power with relatively inexpensive thermal power from the unallocated quota of CPSUs, and mechanism of providing viability gap funding (VGF) to make solar power available at reduced price. Further, the GoI has provided a scheme of Central Financial Assistance (CFA) apart from several other benefits to promote solar rooftop installations and small solar power plants. Also, incentives are being provided for adoption of solar power agriculture pumps by farmers and installation of small renewable power plants by farmers/cooperatives/panchayats on their lands.

Apart from the policy and regulatory support, the growth in solar power capacity was supported by the significant reduction in bid tariffs. The reduction in solar power tariffs was supported by the rapid fall in photo-voltaic (PV) module prices and use of reverse auction-based bidding process for awarding projects. The weighted average competitively bid solar PV tariff declined from Rs. 6.5 per unit in CY2014 to Rs. 5.0 per unit in CY2016 and further to Rs. 2.7 per unit in CY2018. The lowest discovered solar bid tariff was Rs. 2.44 per unit. With decline in capital costs, the dependence of the solar power sector on Government subsidies and preferential tariffs has reduced over the years.

<sup>1</sup>NTPC Vidyut Vyapar Nigam Ltd (NVVN) was appointed as procuring agency which would 'bundle' the relatively costlier solar power with the unallocated power from coal-based stations of NTPC and sell the 'bundled power' to the Distribution Utilities (Discom), thereby reducing the overall purchase cost for the Discoms

Notwithstanding the favourable prospects for the sector, there are multiple challenges related to weak counterparty credit quality of state-owned distribution utilities, which impacts their ability to make timely payments to solar power producers, imposition of safeguard duty on imported PV modules and increase in GST rates, regulatory challenges arising out of inconsistency in RPO norms across states and against the RPO norms suggested by the Ministry of Power, viability of competitive bid-based tariffs and transmission connectivity challenges along with challenges in integration of the growing share of solar power with the grid. In addition, solar power producers remain exposed to regulatory challenges arising from the implementation of forecasting and scheduling regulations.

### **Rating Methodology**

This rating methodology aims to help entities, investors and other interested market participants understand ICRA's approach in analysing the quantitative and qualitative risk characteristics that are likely to affect the ratings of solar power producers. The methodology articulated below is applicable for issuers with greenfield project(s) and operational project(s) (either single asset or portfolio of projects). The list of rating drivers covered here is not exhaustive, but provides an overall perspective on the most important considerations.

ICRA's risk analysis framework for solar power producers can be broadly divided into the following factors:

#### **▪ Business Risk Drivers**

##### **For Projects**

- Permitting risk
- Funding risk
- Construction risk

##### **For Projects and Operational Entities**

- Operating risk
- Demand and tariff risk
- Counterparty credit risk
- Force majeure risk

#### **▪ Industry Risk Drivers**

- Regulatory risk

#### **▪ Financial Risk Drivers**

- Adequacy of future cash flows
- Profitability
- Leverage and coverage indicators
- Liquidity and financial flexibility
- Tenure mismatches and risks relating to interest rates and refinancing
- Foreign currency-related risks
- Debt transaction structure
- Accounting quality
- Contingent liabilities/off-balance sheet exposures

#### **▪ Management Quality and Corporate Governance**

#### **▪ Parentage**

## Business Risk Drivers

Within the business risk assessment, only the greenfield or expansion projects are exposed to permitting risk, funding risk and construction risk.

### Permitting Risk

Permitting risk refers to a company's ability to secure all statutory clearances required for constructing and operating a power plant as well as compliance with the applicable norms. While assessing permitting risk, ICRA evaluates the progress on land acquisition and examines the status of various clearances in accordance with the laws of the land, for the projects under implementation. The critical approvals required for a solar power project also include the approval for transmission connectivity to the designated sub-station and long-term open access for supplying power generated to the grid (state/interstate network). While permitting risk for a greenfield solar power project is relatively lower than thermal or hydro-based projects, given the exemption from environmental and forest clearance (except in case of use of forest land), the developers have faced delays in the past in securing approvals for connectivity to interstate/intrastate transmission network and completing land acquisition, leading to delays in project implementation. In case of projects awarded in solar park, which provides a developed land plot with clearances and associated infrastructure including grid connectivity, permitting risk is relatively lower than that for a greenfield project at locations outside the solar park.

### Funding Risk

The company's ability to tie-up the requisite finances, status of the funding tie-up and capital structure mix are the focus of the analysis here. Given the capital-intensive nature of the solar energy projects and the typical debt-equity ratio of 2.33 times followed by the developers, such projects tend to have high leverage. The capital cost and capital structure are evaluated in relation with other solar energy projects. The reasons for variation (if any) in the capital cost with other solar energy projects is assessed, which may be due to higher cost associated with the land and/or equipment configuration. The equipment configuration<sup>2</sup> in case of solar PV projects may vary depending upon ratio of direct current (DC) capacity, alternating current (AC) capacity and use of trackers<sup>3</sup>, so as to maximise the plant load factor (PLF) level within the permitted level as per PPA terms. The average cost of debt and the currency in which it is denominated are also assessed. While equity is arranged by the sponsor, the developer remains dependent on banks, financial institutions (FIs) and bond markets for debt funding. ICRA evaluates the extent of actual funding tie-up and the likelihood of the balance funding being available in time, so that project progress is not delayed due to lack of funding tie-up. Even though project finance is generally 'non-recourse' in nature, the strength of the sponsors is an important risk mitigant as it imparts financial flexibility in terms of funding cost overruns or meeting other contingencies.

### Construction Risk

Construction risks refer to challenges associated with the physical construction of a plant (including the associated evacuation network which is in the project scope) as well as stabilisation of design operating parameters (which includes plant availability and PLF) subsequent to commissioning. Delays in either can lead to time and cost overruns. Fixed-price, fixed-time contracts, with adequate clauses for liquidated damages (LD) are usually the mitigants against construction risks (essentially, the risk gets transferred to the engineering, procurement and construction or EPC contractor). The developer may either source the plant components such as modules, inverters or balance of system components on its own or may enter into a supply contract with the EPC itself, which then sources it on behalf of the developer. Many developers have also gained expertise and undertake EPC in-house. While assessing the construction risks, ICRA evaluates the track record and experience of the EPC contractor in execution of solar power projects and the status of project construction vis-à-vis the scheduled commercial operation date (COD), including the ancillary services such as transmission connectivity to the designated grid sub-station. Further, the risk of any delays

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<sup>2</sup> DC-AC Ratio: Capacity contracted as per PPA is in alternating current (AC) form so as to be compatible with grid network. At module level, generation is in direct current (DC) form which is converted into AC form through an inverter. Higher DC-AC ratio by way of having higher PV module capacity allows the project to generate higher solar energy; however, this ratio is required to be kept at optimum level (which varies between 1.1 to 1.4 times), depending upon the permitted level of PLF in PPA as well as availability of land at the project site.

<sup>3</sup> Tracker: Tracker directs solar panels or modules toward the sun, by changing their orientation throughout the day to follow the sun's path to maximize energy capture.

in availability of the grid sub-station by the Central or the state transmission utility (as applicable) is evaluated. In all project ratings, ICRA carries out a sensitivity analysis to evaluate the impact of the delay in commissioning or in stabilisation of plant operations on the projected cash flows and debt servicing ability. The LD clauses, which are a part of the contract with the EPC contractor, are also evaluated to assess their adequacy with respect to the loss of profits and/or liquidated damages payable by the developer to offtakers. ICRA also assesses the creditworthiness of the EPC contractor, to the extent possible, and its ability to pay the LD charges to the developer in case the situation arises.

### **Operating Risk**

The operating risks for an issuer engaged in solar power generation arises from the vulnerability of the plant's PLF to variability in solar irradiation, which is susceptible to weather conditions at the project location. ICRA draws comfort from the geographical diversity in the operations, which acts as a mitigant against resource variability risk to some extent. The generation also remains susceptible to the performance of the solar PV modules and inverters. ICRA evaluates the performance warranty terms provided by OEMs (i.e. PV modules for solar PV projects; as well as that of solar concentrator and steam-turbine generator for solar thermal projects) and the track record of such equipment, especially the modules in Indian conditions, to analyse the operating risks for solar power projects.

For operational solar projects, ICRA analyses the actual performance in terms of PLF and its variance against the P-90 and P-75 generation estimate as per the energy yield assessment study by the company's consultant. Projects meeting or exceeding the generation estimates are viewed positively by ICRA. While assessing resource variability risk, ICRA considers the base case PLF in its financial projections in line with the P-90 estimate of the energy yield assessment study. However, ICRA may consider a lower estimate for generation under some circumstances such as performance of other projects in the region. Only in cases where the operating track record is well established beyond three years, ICRA considers the actual PLF level as base case assumption in the projections.

Further, ICRA assesses the track record and experience of the O&M contractor in the solar energy sector. ICRA studies the O&M contract to assess the responsibilities of the contractor and the mitigants available, such as LD clauses, for any shortfall in plant availability or performance ratio below the guarantee level. ICRA undertakes an assessment for adequacy of water availability (in case of water-based cleaning of the modules) at the project sites. ICRA also examines the track record of grid availability for the project and incidence of any grid availability issues in the region. Further, ICRA evaluates the compensation clause in the PPA for grid non-availability and factors the benefit of such clause in the financial projections suitably. In case of PPAs that do not have such clause for compensation due to grid non-availability, ICRA assesses the impact of the same on cash flows for supply of electricity to offtakers, particularly in states where such issue has prevailed and is likely to remain for a longer period.

In addition, ICRA assesses the impact of the scheduling and forecasting mechanism approved by the regulators for solar power projects, wherein deviation between the actual and the projected generation higher than a certain level will attract penalties. Given the variable and intermittent nature of generation by solar power projects and limited track record of the Indian solar power players in forecasting with the required accuracy, the impact of such penalties on the financial profile of the solar power producer is evaluated.

### **Demand and Tariff Risk**

The demand risk for a solar power project is normally mitigated through the tie-up of a long-term power purchase agreement (PPA), which generally includes payment of tariff linked to the electricity units supplied by the solar power project. For assessing demand risk, ICRA evaluates the progress in tie-up of the PPA and the provisions of the PPA such as tenure, tariff, take-or-pay obligation and billing mechanism. The various types of PPA models available for a solar power project include:

- Sale of power at competitive bid-based tariff with power sold directly to a distribution utility or to a nodal agency/trading company with back-to-back power sale agreements (PSAs) with distribution utilities or bulk consumers
- Sale of power to a state-owned distribution utility at the feed-in tariff rate approved by the SERC

- Sale of power at average power purchase pooled cost (APPC) to the distribution utility and availing renewable energy certificates (RECs)
- Sale of power to third-party consumers at mutually agreed tariff or on the power exchange, and availing RECs
- Captive consumption/sale of power under group captive mode

The presence of a long-term PPA for a solar power project at a fixed tariff rate is viewed favourably by ICRA, given that it mitigates the risk associated with demand and pricing. Within the various revenue models, PPAs with Central nodal agencies are viewed more favourably, followed by PPAs with distribution utilities, captive users and third-party consumers, in that order.

**Table 1: Revenue models for a solar power project**

	Realisation	Remarks
A) Competitive bid based	Quoted bid tariff	Under this model, the revenue source for the project is sale of power at the quoted tariff; most of the solar projects that have been commissioned recently or are under development are based on competitively bid tariff-based model; the bidding could be lowest bid (L1) based in which bidders are asked to match L1, or based on reverse bidding in which the bidder who quotes the lowest tariff will be selected first and so on till the total aggregate tender capacity is reached; the projects are also eligible to avail any incentives from the Central and state governments
	Quoted bid tariff + VGF	Solar Energy Corporation of India (SECI) is the nodal agency under JNNSM for award of solar projects under VGF framework; under VGF framework, bid parameter is the quoted amount of VGF subject to a ceiling and the base solar tariff payable to the bidder is pre-determined; the bidder with the lowest VGF requirement wins the bid; in case the VGF quoted is zero, the bid variable is the discount offered to the base tariff; thus, revenues for the winning bidders comprises sale of power at pre-determined solar tariff or quoted tariff, whichever is lower, and VGF; the VGF is disbursed to the winning bidders, post commissioning of the projects as per the terms of VGF framework; in light of the significant reduction in bid solar tariffs, the VGF support mechanism has been discontinued for new projects
B) Feed-in tariff	Feed in tariff	Under this model, the revenue source for the project is sale of power at the approved feed-in tariff rate; the feed-in tariff is a normative tariff approved either by SERC or CERC based on normative assumptions (i.e. related to cost parameters, PLF and the regulated return on equity)
C) Renewable Energy Certificate (REC)	There are two components in both the REC options, i.e. electricity component and solar REC component; solar REC pricing is discovered on power exchange, subject to floor and ceiling levels as determined by CERC	
Option 1	APPC + Solar REC	The tariff for sale of power under this model is based on the average power purchase cost (APPC), which is notified by the SERCs. In states where APPC is determined differently from the CERC's notified REC regulations or there is a delay in APPC determination, ICRA views the business risk of the solar assets negatively; the extent of RPO compliance by the obligated entities remains the key driver for REC demand and has an impact on the REC price level
Option 2	Bilateral tariff with third party / spot tariff on Power Exchange + Solar REC	The electricity component in this option is either the bilateral tariff contracted with a third party or the spot tariff by sale of power on the power exchange; the projects are also eligible for RECs to the extent of the power sold; the extent of RPO compliance by the obligated entities remains the key driver for REC demand and has an impact on the REC price level

	Realisation	Remarks
		The economics for solar projects for third-party sale remain favourable, especially in states with relatively high HT tariffs for industrial customers; however, such projects remain exposed to regulatory risk arising from any restrictions imposed by the utilities on open access and/or increase in open access charges (wheeling charges, transmission charges, banking charges, cross-subsidy surcharge and additional surcharge) by the SERCs
D) Captive Consumption / Sale of Power under Group Captive Mode	Mutually agreed tariff	Under this model, the power generated by the solar power project is consumed captively or sold to a group of captive customers, who own at least a 26% stake in the solar power project and consume at least 51% of the power generated by the project; such projects remain exposed to regulatory risk arising from any restrictions imposed by the utilities on open access and/or increase in open access charges (wheeling charges, transmission charges, banking charges and additional surcharge) by SERC. This apart, the Group captive-based projects remain exposed to policy risks related to the ownership criteria

For projects having PPAs with third-party consumers or for captive consumption, ICRA assesses the adequacy of the banking and wheeling arrangements with the state distribution utilities under the prevailing open access regulations by the SERC. For projects availing the REC benefit, ICRA evaluates the solar REC sales trends and price movement on the power exchanges. Further, in case of projects selling power at APPC rate, delay in determination or deviation from CERC's regulations for determining APPC increases the business risk of the solar assets. ICRA continuously observes the regulatory and policy environment w.r.t. any amendments or new developments that may impact the implementation of REC, RPO and open access framework. ICRA also notes the applicable policy norms w.r.t. the eligibility criterion and equity ownership norm for group captive projects. For rooftop-based solar projects, ICRA evaluates the applicable regulations by SERC w.r.t. net metering<sup>4</sup> policies in the respective states. While analysing the demand risk for projects that do not have long-term PPAs, ICRA evaluates the trajectory of approved solar RPO for the offtaking entities and estimates the solar energy capacity required to meet the solar RPO target.

Though solar-based energy generation is allowed as a 'must run' principle under the Indian Electricity Grid Code, back-down restrictions were imposed by the utilities in a few cases in the past. ICRA assesses the cost competitiveness of solar energy tariff with the cost of power purchase from alternative sources for the offtaker. Solar power projects with competitive cost of generation can also explore other avenues for sale of power, especially in states with relatively high tariffs for HT industrial customers. However, such projects remain exposed to regulatory risk arising from any restrictions imposed by the utilities on open access and/or increase in open access charges by the SERC. ICRA assesses the events of defaults in the PPA and adequacy of cash flows from termination penalty and subsequently from third-party sale of power from credit perspective, in case of termination of such PPAs.

### Counterparty Credit Risk

In assessing counterparty credit risk, ICRA evaluates the financial position of the counterparty, the track record of payments and the strength of the payment security mechanism (PSM). State-owned distribution utilities, being the key obligated entities to meet solar RPO norms, are offtakers for solar power producers in most cases. The PSM in PPAs with these utilities usually comprises revolving letter of credit (LC) for an amount equivalent to one month of billing. In addition to the PSM, ICRA examines the clauses in the PPAs in case of delays in payments by the offtaker, like the availability of right for sale of power to an alternative buyer, in case delays in making payments exceed a certain limit. In case of PPAs with multiple utilities, the diversification in the counterparty risk is factored in the rating. While the credit quality of a state-owned distribution utility is linked to the intrinsic credit quality of the state government, ICRA assesses the distribution

<sup>4</sup> Net Metering: Under net metering arrangement, the owner of a rooftop solar PV plant will be able to sell excess power generated to the distribution utility and procure electricity from the distribution utility as and when required, using a bi-directional meter to track this electricity exchange

utility's financial position in terms of trends in cost coverage ratio, periodicity and adequacy of tariff revision with respect to cost of supply as well as trends in operating efficiency metrics.

For projects where the PPA is signed with an intermediary procurer such as NTPC Vidyut Vyapar Nigam (NVTN) or SECI, which are the nodal agencies under NSM and in turn sign PSA with the ultimate offtakers being state-owned distribution utilities, ICRA examines the key clauses related to PSM under the PSA as well in addition to the PPA. Further, ICRA evaluates and suitably factors in the policy benefits available while assessing the counterparty credit risk of discoms, such as provision for payment security fund supported by budgetary allocation from MNRE under policy framework. ICRA also considers the bundling mechanism benefit for projects having PPAs with NVTN, which in turn improves the cost competitiveness of the bundled power from the discoms' perspective due to bundling of solar power with thermal power in predetermined ratio and thereby lowers the risk of payment delays. These apart, ICRA notes the benefits available to SECI which is covered under the tripartite agreement<sup>5</sup> with RBI, state governments and the GoI to ensure timely payments under PSAs between SECI and state discoms for supply of power.

In case of operational projects, ICRA focuses on the timeliness in cash collections from the offtakers and the extent of compliance of PSM in line with the terms of the PPA. ICRA positively views the realisation of payments within PPA-stipulated timelines from the offtakers. For under-construction projects, ICRA analyses the track record of payments by the offtaking utility to other IPPs.

### Force Majeure Risk

Like any infrastructure project, solar power projects are also vulnerable to force majeure events. While this risk relates to the expected loss in the event of a default rather than the probability of default, the presence of force majeure clauses in the PPAs limit the company's liability arising from non-performance or underperformance. ICRA examines if, and the extent to which, the force majeure risks are mitigated through insurance contracts or by specific provisions in the PPA that cover such eventualities. The strength of these mitigants influences the overall financial flexibility of a company.

## Industry Risk Drivers

### Regulatory Risk

While assessing regulatory risk, ICRA focuses on the trends in solar RPO norms and compliance to these norms by the obligated entities, given that a favourable regulatory framework remains one of the key drivers for capacity addition in the sector. ICRA assesses the extent to which RPO norms laid out by the SERC vary against the suggested levels by the Ministry of Power, GoI and enforcement measures by the SERCs for shortfall in RPO compliance. A weak RPO compliance by obligated entities, coupled with inconsistencies in the RPO norms by SERCs, affect the demand for renewable energy, including solar power. A weak RPO compliance also affects the demand for RECs, in turn adversely impacting the projects based on the REC route. Further, any constraints in allowing open access and banking arrangements and increase in open access charges pose regulatory risks for solar power projects, which are based on third-party sale/captive consumption/group captive sale.

Further, given that state-owned distribution utilities remain the key offtakers in most cases, ICRA focuses on regulatory risks in the distribution sector pertaining to the risk of delay in the tariff determination process, risk of inadequate tariffs in relation to the cost of supply and risk of non-implementation of any tariff order due to litigation. Challenges like these can impact the financial position of the state distribution utilities and in turn the counterparty credit risk for solar power producers.

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<sup>5</sup> SECI is a beneficiary of the tripartite agreement (TPA) between Government of India, State governments and Reserve Bank of India (RBI) which ensures a payment security mechanism for supply agreements between Central PSUs such as SECI and state discoms.

## Financial Risk Drivers

### Adequacy of Future Cash Flows

Since the prime objective of the rating exercise is to assess the adequacy of the company's debt servicing capability, ICRA draws up projections on the likely financial position of the company under various scenarios, in addition to reviewing the past financials. The future cash flows are projected considering the tariff under the PPA, PLF (based on P-90 estimate in the base case scenario), O&M cost as per the contractual terms with the O&M contractor, replacement cost of inverters over the debt repayment tenure, interest cost, debt repayment schedule, working capital requirements and other funding requirements related to expansion (if any). These cash flows are then used to determine the company's future debt servicing capability. Further, ICRA evaluates the breakeven PLF for the project over the debt servicing period and compares it with the estimated PLF as per solar resource assessment study for a greenfield project and with the actual PLF in case of an operational project to determine the cushion available from a debt servicing perspective.

The various financial metrics assessed by ICRA could be divided into four categories — profitability, leverage, coverage, and liquidity. This document provides a summary of why ICRA considers these ratios to be important. For a more detailed description, readers may refer to the note titled, Approach for Financial Ratio Analysis, published on ICRA's website.

### Profitability

The revenue profile for a solar power project having a PPA remains sensitive to the level of energy generation, which in turn depends upon the solar irradiation/weather pattern at the project location. Any adverse variation in weather pattern/solar irradiation availability impacts the generation, which in turn impacts the company's revenues and cash accruals. However, for projects without PPA, the revenue profile remains sensitive to the level of power offtake, in addition to generation. Given the capital intensity of the project and low operational expenses, the rating methodology focuses on return indicators (IRR) instead of profitability indicators. ICRA assesses the project IRR in relation to the company's weighted average cost of capital.

For projects based on regulated tariffs, returns remain dependent upon their ability to ensure both the actual costs and PLF within the normative benchmarks. For projects based on the REC route, returns remain exposed to the market risks associated with the REC demand and pricing. ICRA evaluates the extent of cash flow mismatches for such projects, if the RECs remain unsold. For projects based on competitively bid tariff, returns remain dependent upon the project developers' ability to ensure that the PLF level, the capital cost as well as other operating and financing costs are in line with bid assumptions in quoted tariff.

### Leverage and Coverage Indicators

As solar energy projects are capital intensive, the extent of leverage level for these companies is inherently high. ICRA compares the capital cost and leverage (debt to equity, and total debt to operating profits) of a project with those of its peers as well as with the normative benchmarks to assess its relative position. Generally, a conservative leverage ratio is viewed favourably as it reflects a lower quantum of committed outflows, while a long maturity profile and lower cost of the loans can partially offset the risk associated with a high financial leverage.

The debt coverage indicators that are examined include interest coverage ratio, cumulative debt service coverage ratio (DSCR) and minimum DSCR over the debt repayment tenure. ICRA also evaluates multiple scenarios to assess the cumulative DSCR over the debt repayment period as well as the project IRR with the key sensitive variables, which include project cost overrun, PLF, panel degradation and cost of debt (only for DSCR). In case of projects adopting the REC route, additional sensitivity factors include the trends in APPC/bilateral/spot tariff rates and realisation of the REC. Further, in case of solar power projects selling power to third-party consumers, additional sensitivity factors include open access charges and HT grid tariff of the counterparty, as approved by the SERC.

The various ratios which are typically used to analyse a company's coverage metrics are:

Ratio	Computation
<b>Interest Coverage Ratio</b>	(Operating Profit) / (Gross Interest expense)
<b>Debt Service Coverage Ratio</b>	(Net Profit After Tax + Gross Interest + Depreciation) / (Gross Interest + Repayment + Dividend on Preference Shares)

In addition, ICRA compares the debt repayment tenure in relation to the tenure of the PPA tied-up by the solar power producer. If the repayment tenure is longer than the PPA tenure, the coverage metrics are evaluated for any revision in tariff post the expiry of the PPA based on the prevailing tariff trends for similar projects in the sector. In case of entities having bullet debt repayment, ICRA examines the refinancing ability of such projects by assessing the expected cash flows from the balance tenure of the project life. Herein, ICRA considers ratios such as project life coverage ratio (PLCR) and loan life coverage ratio (LLCR) for assessing the debt servicing capability.

The various ratios which are typically used to analyse a company's refinancing ability are:

Ratio	Computation
<b>Project Life Coverage Ratio</b>	(Net present value of the projected cash flows from the project over the balance life) / (Outstanding debt)
<b>Loan Life Coverage Ratio</b>	(Net present value of the projected cash flows from the project over the balance debt repayment tenure) / (Outstanding debt)

### Liquidity and Financial Flexibility

For a company with an operational project, ICRA assesses the liquidity by analysing the trends in cash collections from the counterparty, availability of cash DSRA and availability of undrawn working capital limits. ICRA further evaluates the company's relationships with banks, financial institutions and other intermediaries, its financial flexibility (reflected by its unutilised bank/credit limits, liquid investments) as well as the financial strength of the promoter group to infuse funds to meet cash flow shortfall, if any.

### Tenure Mismatches and Risks Relating to Interest Rates and Refinancing

Given the capital-intensive nature of operations for solar power projects, ICRA views a longer debt maturity profile and ballooning repayment structure positively. Dependence on short-term borrowings to fund long-term investments can expose a company to significant refinancing risks, especially during periods of tight liquidity. The existence of adequate buffers of liquid assets/bank lines to meet short-term obligations is viewed positively. ICRA also evaluates the impact of movement in interest rates on the debt coverage indicators of the project.

### Foreign Currency-related Risks

The foreign currency risk can arise from unhedged foreign currency liabilities pertaining to funding of capital expenditure and/or working capital. The focus here is on assessing the hedging policy of the issuer concerned in the context of the company's entire cash flows being denominated in domestic currency. Firm hedging, if not for the entire tenure of debt, then at least for the near-term foreign exchange repayment commitments, is viewed positively.

### Debt Transaction Structure

ICRA reviews the debt transaction structure to evaluate features available to provide additional protection to the lenders/bondholders. This could include cash flow waterfall mechanism, creation of reserve funds for debt servicing, stipulation on minimum coverage ratios that must be met before payment to subordinate debtholders or declaration of dividends, credit enhancement features like cash collateral for payment of interest during construction period, completion guarantees by sponsors and guarantee for debt servicing by other external entities, restriction on the ability of the project company to take on additional debt and/or capital expansion without the approval of the lenders/bondholders, etc.

### Accounting Quality

The accounting policies, notes to accounts and auditors' comments that are part of the annual report are reviewed. Any deviation from the accounting standards is noted and the financial statements of the entity are adjusted to reflect the impact of such deviations. In case of solar power projects adopting the REC sale route,

the accounting policy related to unsold RECs is evaluated and suitable adjustments are made in the financial statements.

### **Contingent Liabilities/ Off-balance Sheet Exposures**

For this, the likelihood of devolvement of contingent liabilities/off-balance sheet exposures and the financial implications of the same are evaluated.

### **Management Quality and Corporate Governance**

All debt ratings necessarily incorporate an assessment of the quality of the rated entity's management. An entity with an experienced management and independent directors on its board are considered positive factors. An entity should practice sound corporate governance policies to serve the interest of all stakeholders. The management risk analysis also factors in the historical track record of the entity or Group in timely servicing its obligations. Any delay or default history in the repayment of principal or interest payments reduce the comfort level for the rated entity's future debt servicing capability and willingness. Nevertheless, ICRA appropriately analyses the reason behind the past defaults, which could also be due to adverse demand situations in the underlying industry.

In addition, the rated entity's likely cash outflows arising from the possible need to support other Group entities are important, in case the rated entity is among the stronger entities within the Group. Usually, a detailed discussion is held with the management of the rated entity to understand its business objectives, plans and strategies, and views on the past performance, besides the outlook on the rated entity's industry. Some of the other points assessed are:

- Experience of the promoter/management in the line of business concerned
- Commitment of the promoter/management to the line of business concerned
- Attitude of the promoter/management to risk taking and containment
- The issuer's policies on leveraging, interest risks and currency risks
- The issuer's plans on new projects, acquisitions, expansion, etc.

### **Parentage**

Apart from the standalone credit considerations, the likelihood of extraordinary support from the parent to an entity or the support that an entity is likely to extend to the other Group companies is factored while assessing the credit profile of the entity. This process involves an assessment of the ability and willingness of the parent to extend support to the entity (and vice-versa), in addition to evaluating the entity's own fundamental credit strength.

Despite the non-recourse nature of the entity, the financial strength of the parent/sponsor is a credit factor, given that apart from contributing the equity capital and/or subordinated debt, a stronger sponsor has greater wherewithal to meet any funding shortfalls faced by the SPV, while ensuring timely financial closure of the project.

### **Summing Up**

ICRA's credit ratings are a symbolic representation of its opinion on the relative credit risk associated with the instrument being rated. This opinion is arrived at following a detailed evaluation of the company's business and financial risks, likely cash flows over the life of the instrument being rated and the adequacy of such cash flows vis-à-vis its debt servicing obligations.

As this note highlights, for solar power projects, project risks assume importance during the implementation phase, while post-COD, it is the adequacy of cash flow generation vis-à-vis the debt servicing commitments that primarily influence the rating. As revenues and cash flows for a solar power project remain sensitive to the level of electricity generation and tariff tied-up under the PPA, various scenarios are drawn up to assess the impact of key variables on the debt-servicing metrics. While the key sensitive variables differ depending upon the revenue model of the project, the most commonly used ones are capital cost, tariff, PLF and interest rate for solar energy projects. While the financial projections enable ICRA to assess the adequacy of cash

flows from the debt servicing perspective, the rating assigned is dependent upon the strength of the sponsors and the track record of the sponsor group in power project development and operations.

## Glossary

Key Terms	Definition
<b>Average Pooled Purchase Cost (APPC)</b>	The weighted average pooled price at which the distribution utility has purchased the electricity including cost of self-generation, if any, in the previous year from all the energy suppliers (long term and short term), excluding those based on renewable energy
<b>Accelerated Depreciation</b>	The AD benefit is available at 80% of project cost for projects commissioned till March 31, 2017; for projects commissioned thereafter, the AD benefit will be lower at 40%.
<b>Cost Coverage Ratio for a discom</b>	Annual Revenue Realisation (ARR) / Average Cost of Supply (ACS)  ARR = Cash Collection inclusive of subsidy receipts / Units Sold ACS = Total expenditure / Units Sold
<b>IPP</b>	An IPP is a non-state utility, which owns and operates a power generation project for sale of power to discoms
<b>Plant Availability Factor (PAF)</b>	PAF for a generating station means the average daily declared capacity of the power plant as a percentage of the installed capacity less auxiliary consumption
<b>Preferential or Feed-in Tariff</b>	Tariff determined by the SERC for sale of electricity generation from a renewable energy project to the state distribution utility
<b>P90 PLF</b>	The P90 estimate of generation is the generation which a solar plant is 90% likely to produce over an average year
<b>Renewable Purchase Obligation</b>	Obligation of an entity (distribution utility, open access consumers and captive power consumers) to purchase a proportion of their electricity consumption from renewable sources of energy as per the notified regulations by respective SERCs
<b>Renewable Energy Certificates</b>	RECs have been designed to address the mismatch between the availability of renewable energy sources and the requirement of obligated entities to meet their RPO, given that renewable energy sources are concentrated in a few states; one REC is equivalent to 1 MWh of electricity; renewable energy-generating companies shall be eligible for issuing and trading RECs, subject to conditions notified by CERC; the obligated entities can purchase RECs on the energy exchange towards meeting their RPO target

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