RATING METHODOLOGY FOR SOLAR POWER PRODUCERS

JULY 2021

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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 July 2019. 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 40,095 MW as on March 31, 2021 from 10 MW as on March 2010. The share of solar energy-based capacity within the renewable energy (RE) segment in India has increased to 42.4% as on March 31, 2021 from negligible levels as on March 31, 2010 and now holds the largest share in the renewable energy segment. Its share within the overall installed power generation capacity in India stood at 10.5% as on March 31, 2021. The growth in the solar energy sector has been driven by strong policy support by the Government of India and various state governments, regulatory support in the form of renewable purchase obligation (RPO) norms and significant improvement in cost competitiveness of solar energy. The Government of India has set a renewable energy capacity target of 175 GW by the year FY2022 comprising 100 GW of solar power generation capacity, 60 GW wind power generation capacity, 10 GW biomass power generation capacity and 5 GW small hydropower generation capacity. Further, the Government has set a renewable energy capacity target of 450 GW by FY2030.

The demand for solar energy is driven by a confluence of factors, including policy focus on renewable energy sector, large untapped solar power potential, improvement in cost competitiveness of solar-based power evident from the significant reduction in solar bid tariffs under the competitive bidding-based schemes and the growing demand for electricity. The decline in solar power bid tariffs is led by a decline in module prices, improvement in module efficiencies and presence of strong intermediate procurers like the Solar Energy Corporation of India (SECI) and NTPC Limited (NTPC). Additionally, the Government is promoting 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.

Notwithstanding the strong growth potential, the solar power projects face challenges owing to delays in land acquisition, delays in securing transmission connectivity and delays in signing of power purchase agreements (PPAs) by the intermediate procurers owing to delays in signing of power sale agreements (PSAs) with state distribution utilities (discoms).

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Also, the operational solar project face risk of delays in payments due to exposure to weak counterparty credit quality of state-owned distribution utilities. Additionally, the sector is exposed to regulatory challenges associated with the inconsistency in renewable purchase obligation (RPO) norms across states and against the RPO norms suggested by the Ministry of Power, risks associated with the viability of competitive bid-based tariffs and challenges in integrating growing share of solar power with the grid leading to grid curtailment issues. Moreover, the bid tariffs are facing the risk of upward pressure following the imposition of basic customs duty on imported PV cells and modules. In addition, solar power producers remain exposed to regulatory challenges arising from the implementation of the forecasting and scheduling regulations.

ICRA's Risk Analysis Framework for Solar Power Producers

Solar power projects are usually developed through special purpose vehicles (SPVs) with cash flow ring fencing from the sponsors. The projects typically have power purchase agreements (PPAs) for a period of 25 years, which is also considered as the useful life of the projects. 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	Industry Risk Drivers	Financial Risk Drivers	Other Elements of Credit Risk Assessment	Management and Parentage
▪ Permitting risk ▪ Funding risk ▪ Construction risk ▪ Operating risk ▪ Demand and tariff risk ▪ Counterparty credit risk ▪ Force majeure risk	▪ Regulatory risk	▪ Adequacy of future cash flows ▪ Profitability ▪ Leverage and coverage indicators ▪ Liquidity	▪ 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 ▪ Event Risks	▪ Quality of Management ▪ Financial Policy ▪ Governance Structure and Practices ▪ Parentage

Business Risk Assessment

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 solar power plant as well as to comply 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 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 the 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, the permitting risk is relatively lower than that for a greenfield project at locations outside the solar park.

Funding Risk

This section focuses on the company's ability to tie-up the requisite finances, the status of the funding tie-up and the capital structure mix. Given the capital-intensive nature of the solar energy projects and the typical debt-equity ratio of 70:30 or 75:25 is 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 average cost of debt and the foreign exchange component in debt (if any) are also looked at. The equipment configuration[1] in case of solar PV projects may vary, depending upon the ratio of direct current (DC) capacity, alternating current (AC) capacity and use of trackers[2], 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 mitigation factor 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) after 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 mitigating factors 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 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 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 off-takers. 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. The generation also remains susceptible to the performance of the solar PV modules and inverters. Moreover, the modules undergo a degradation in efficiency, which typically is about 0.7% per annum. ICRA evaluates the performance warranty terms provided by OEMs and the track record of such equipment, especially the modules in Indian conditions, to analyse the operating risks for solar power projects. Typically, the OEMs provide a warranty for 90% of the rated output by the end of 10 years and 80% at the end of 25 years. Given the

1 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 1.5 times), depending upon the permitted level of PLF in PPA as well as availability of land at the project site.

2 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.

large dependence on overseas suppliers and risk of solar PV OEMs exiting the business due to large competition and pricing pressure, the ability of the developers to enforce warranty claim could be a challenge. In this context, ICRA evaluates the track record of the module suppliers in honouring the warranty claims and availability of mitigants like third party insurance cover for the warranty.

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. For projects with an operating track record beyond three years, ICRA considers the actual PLF level as base case assumption in the projections.

The solar power plant's PLF could get adversely impacted, in case of inadequate maintenance by the O&M partner. In this context, ICRA reviews the O&M contract to assess the available mitigants 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. Also, ICRA examines the track record of grid availability for the project and incidence of any grid availability issues in the region. In addition, 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 in the past and is likely to remain for a longer period.

The scoring thresholds for the operating parameters of a solar power project is provided below:

	Strongest	Weakest
Plant Availability (PAF)	PAF > 97%	PAF<85%
Grid Availability (GA)	GA > 97%	GA<85%
Plant Loan Factor (PLF)	PLF >= P-90 estimate and track record of more than 18 months	PLF < 75% of P-90 estimate

In addition, ICRA assesses the impact of the scheduling and forecasting mechanism approved by the regulators for solar power projects, wherein higher-than-permitted deviation between the actual and the forecasted generation will attract penalties. Given the variable and intermittent nature of generation by solar power projects and the 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.

Asset Diversification

Most of the solar power SPVs have single location projects, leading to asset concentration and exposing the project performance to weather conditions at that site. Also, there is a greater degree of risk from any force majeure events. In case of projects spread across multiple locations in different states, ICRA draws comfort from the geographical diversity of the portfolio, which acts as a mitigant against radiation variability risk to some extent.

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. A solar power project can tie-up PPA through multiple ways including with [a] central intermediate procurer or state distribution utility

(discom) through the competitive bidding route, [b] state discom through the feed-in tariff mechanism, [c] state discoms at the average power purchase pooled cost (APPC) rate and availing renewable energy certificates (RECs) and [d] large commercial and industrial (C&I) customers under the third party PPA or captive mode. Currently, majority of the projects are securing PPAs through the bidding route with the intermediate procurers like the SECI and the NTPC or state discoms followed by the PPAs with C&I customers.

For assessing the demand risk, ICRA evaluates the status of the PPA tie-up and the provisions of the PPA such as tenure, tariff, take or pay obligation, PLF floor and cap, billing and payment security mechanism, compensation clauses for grid unavailability and grid curtailment, events of default and termination payments. The presence of a long-term PPA 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, the PPAs with central nodal agencies are viewed more favourably compared to the PPAs with state distribution utilities and C&I customers, due to factors such as adequate payment security mechanism and tripartite agreement benefit for realising payments from discoms. Further, the PPAs having clauses mitigating risks associated with grid curtailments and having termination payments in case of buyer event of default are viewed favourably.

Though solar-based energy generation is allowed as a 'must run' principle under the Indian Electricity Grid Code, back down restrictions have been imposed by the utilities in the past in a few cases. ICRA assesses the tariff competitiveness of the solar energy tariff in PPA in relation to the average power purchase cost as well as marginal variable cost of power purchase for the off-taker utility. For projects having PPAs with third party consumers or for captive consumption, ICRA assesses the regulatory environment related to eligibility criterion for group captive projects, adequacy of the banking and wheeling arrangements and open access charges. Also, for projects with C&I customers, the adequacy of the lock-in period in the PPA in relation to the debt tenure and availability of termination payments is evaluated. For projects availing the REC benefit, ICRA evaluates the REC sale trends and price movement on the power exchanges. Further, in case of projects selling power at APPC rate, delay in determination or deviation from the CERC's regulations for determining APPC increases the business risk of the solar assets. For rooftop-based solar projects, ICRA evaluates the applicable regulations with respect to net metering[3] policies in the respective states.

For projects wherein the PPA tenure is lower than debt tenure, such projects remain exposed to tariff risk. In such scenario, solar power projects with competitive cost of generation can explore the avenues for power sale, especially in states with relatively higher tariffs for HT industrial / commercial customers, besides utility auction route. However, such projects also remain exposed to regulatory risk arising from any restrictions imposed by the utilities on open access and/or an increase in open access charges by the SERCs in the respective states.

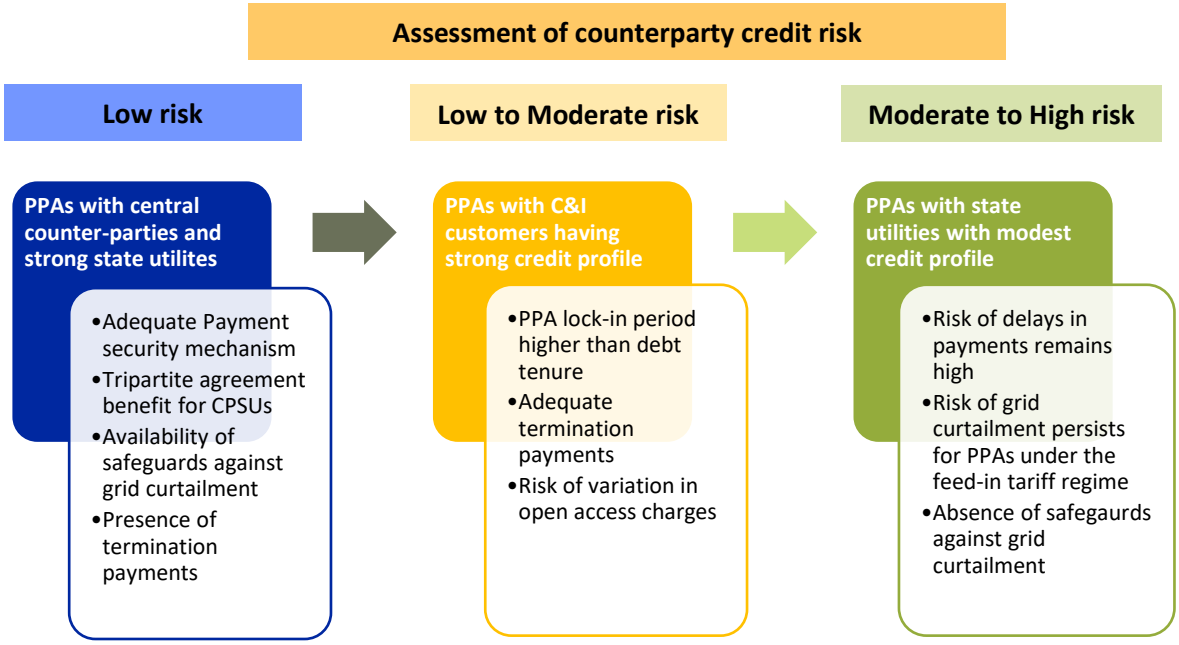
Counterparty Credit Risk

In assessing the 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 off-takers 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 off-taker, 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 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.

3 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

For projects where the PPA is signed with a central intermediary procurer such as NTPC Vidyut Vyapar Nigam (NVVN) or NTPC or the SECI, which are the nodal agencies under the NSM and in turn sign PSA with the ultimate off-takers 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 payment security benefits available for PPAs with central counterparties, such as a) letter of credit, b) provision for payment security fund supported by budgetary allocation from MNRE under policy framework, and c) benefits available to SECI / NTPC which are covered under tri-partite agreement[4] with the RBI, the state governments and the Government of India to ensure timely payments under power supply agreements between SECI / NTPC and state discoms for supply of power. ICRA also considers the bundling mechanism benefit for projects having PPAs with NVVN, 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. In case of PPAs with third party C&I customers, ICRA also assesses the counterparty credit risk by evaluating the financial position of such off-takers.

In case of operational projects, ICRA focuses on the timeliness in cash collections from the off-takers 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 off-takers. For under-construction projects, ICRA analyses the track record of payments by the off-taking utility to other IPPs. If the SPV is dependent on a limited number of counterparties, the rating of the SPV is linked to the counterparties' credit profile, unless there are mitigating factors such as strong liquidity buffer and presence of a strong parent / promoter group which is expected to provide support to the SPV, in case need arises.



Industry Risk Drivers

Regulatory Risk

The regulatory risks are mainly seen for the projects having PPAs under the REC route or for projects selling power under the open access route. A weak compliance of the RPO norms by obligated entities, coupled with inconsistencies in the RPO norms by the SERCs, affect the demand for renewable energy and the demand for the RECs. This in turn adversely impacts the projects

4 NTPC/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.

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 off-takers 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.

While the PPAs are contractual documents, instances of attempts to re-negotiate the PPA terms unilaterally have been seen recently, resulting in prolonged legal & regulatory proceedings. In the interim, such events could impact the payments from the off-taker, adversely impacting the project cashflows. Any incidence of such regulatory issue would remain an event risk.

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 for under-construction projects and for projects with less than three years of track record; actual PLF for projects for more than three years of track record with suitable adjustments related to any one-off events), 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 the PPA, the revenue profile remains sensitive to the level of power offtake, in addition to generation. Given the capital intensity of the project, low operational expenses and finite life, 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 that the actual costs and PLF are in line or better than 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, the 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 dependence on external debt is inherently high. ICRA compares the capital cost, funding pattern (debt to equity) and leverage (total debt to operating profits) of a project with those of its peers 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 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.

Typically, the developers infuse the required promoter contribution for a project SPV through a mix of equity and unsecured debt. As per the terms of the loan agreement, such promoter debt remains subordinated to the project debt from lenders and the payments on the promoter debt is allowed by lenders, subject to meeting the stipulated restricted payment conditions. Also, the sub debt holders do not have a right to call an event of default leading to either acceleration of the debt payment or initiation of bankruptcy proceedings. In such instances with presence of an escrow / cash flow waterfall mechanism monitored by the lenders/trustee, the leverage and coverage metrics for the project SPV are assessed on the external project debt.

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

Ratio	Computation
Debt Service Coverage Ratio	(Net Profit After Tax + Interest + Depreciation) / (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.

Assessment of Profitability, Leverage and Coverage metrics

[Indicative Metrics]

Salient Parameters	Key Ratios	Strongest	Weakest
Leverage	Total Debt/ OPBITDA	<=1.5	>6.0
Coverage	Cumulative DSCR over the debt tenure	>=1.5	<1.1
	Minimum DSCR over the debt tenure	>=1.35	<1.0
Profitability	Internal Rate of Return (IRR)	>=12%	<4%

Liquidity

Liquidity is the measure of an entity's ability to meet its short-term cash obligations from various internal or external resources. For a solar power project, internal resources include cash flows from sale of power, debt service reserve account (DSRA) and free cash balances. External resources include undrawn lines of credit or equity capital. The short-term obligations include

operating costs, debt servicing obligations, working capital requirements and capital expenditure (if any). The higher the cushion available between the resources available (especially internal resources) and the obligations, better is the liquidity profile of an entity. ICRA also notes that the liquidity available with an entity may be for a temporary period and hence an entity's overall policy towards maintaining adequate liquidity in the form of DSRA, undrawn working capital lines and free cash balances is accorded due importance in the analytical approach. ICRA evaluates the transaction documents to ascertain the availability of DSRA prior to default, to ensure timely debt servicing. If DSRA is available for use only post default or is contingent on meeting certain conditions, ICRA does not consider DSRA for the liquidity assessment.

For a solar power SPV, surplus cash flows post meeting the financial covenants stipulated by the lenders, and after maintaining liquidity reserves and as per the cash flow waterfall mechanism are assumed to be paid out to sponsor and/or used for debt prepayment under cash sweep mechanism of the loan agreement.

Other Elements of Credit Risk Assessment

Financial Flexibility

An entity's financial flexibility (or the lack thereof) is reflected in its ability to access the capital or the money markets at short notice, attract diverse and marquee investors and enjoy the confidence of banks, financial institutions and intermediaries. A strong financial flexibility allows an entity to raise fresh borrowings or refinance existing ones in quick time and whenever required. For a solar power project, financial flexibility could arise from factors such as the tail period[5] available in the PPA and/or strong parentage or linkages with a strong group.

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.

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

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 systemic liquidity. One source of mitigation could be the existence of adequate buffers of liquid assets/ committed bank lines to meet short-term obligations. Another source of mitigation could be the entity's strong financial flexibility to be able to garner fresh funds at a short notice or a potent ability to refinance. ICRA also evaluates the impact of movement in interest rates on the debt coverage indicators of the issuer.

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.

5 Residual PPA tenure post completion of scheduled debt repayment

Debt Transaction Structure

ICRA reviews the debt transaction structure to evaluate features available to provide additional protection to the lenders/bondholders through presence of escrow mechanism and ring fencing of cash flows. This would include the cash flow waterfall mechanism, creation of reserve funds for debt servicing and stipulation on minimum coverage ratios that must be met before payment to subordinate debtholders (mainly sponsor debt) or declaration of dividends. This apart, availability of completion guarantees by sponsors, guarantee for debt servicing by other external entities, provision for inverter replacement reserve, restriction on the ability of the project company to take on additional debt and/or capital expansion without the approval of the lenders/bondholders and implementation of cash sweep mechanism to use surplus cash flows for debt prepayment by the lenders is viewed positively by ICRA.

Accounting Quality

ICRA reviews the accounting policies, notes to accounts and auditors' comments that are part of the annual report of the rated entity. 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.

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 mitigating factors influences the overall financial flexibility of a company.

Event Risks

ICRA recognises the possibility of events such as mergers and acquisitions, asset sales and litigations, which could have a material impact on the credit profile of an entity. Incorporating the impact of such discrete events in the credit rating, from the beginning, is often difficult. Depending on whether and when such events occur, the rating opinion could be substantially different. To take rating decisions in such cases, ICRA applies its analytical judgement based on the rated entity's track record, the credibility of the management and the experience of having seen similar situations play out in other entities. However, given the nature of such events, it is possible that the rating may undergo a material change later, upon the occurrence of the event.

Parentage

Despite the non-recourse nature of the debt availed by the issuers in solar power sector, 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. Further, during the pre-COD stage, most of the projects take recourse of the sponsor for cost overrun support.

If the parent's or promoter group credit profile is relatively stronger than the rated entity, ICRA assesses the ability and the likelihood of the parent extending extraordinary support to the entity. Support here means financial support from the parent expected to be available to the entity in the form of loans, equity, extended credit period, advances etc in times of credit or liquidity stress on the entity. Support here does not mean operational support. It may be noted that promoters in their individual capacity, or private equity firms/ other financial investors are generally not treated as parents for assessing the likelihood of extraordinary financial support coming in.

While the weak financial health of the sponsor constrains its ability to support the project SPVs in the time of need, presence of a financially strong sponsor need not necessarily mean assured support to fund SPVs in case of any funding shortfall. In the absence of explicit support (guarantees/letters of comfort/ shortfall undertakings), the sponsors' willingness to support the operational projects is determined by the long-term project attractiveness, which is a function of the strength of the project cash flows and duration of the tail period. Also, ICRA considers the past track record of the sponsor in extending timely support to any of its other SPVs and gauge the intent of the sponsor to extend extraordinary support to the rated SPV based on our interactions with the sponsor.

Management Quality Assessment

In addition to the industry, business and financial risk analysis, all credit ratings incorporate an assessment of the quality of the rated entity's management, the financial policies and the governance practices.

Quality of Management and Financial Policies

As a part of its process, ICRA undertakes discussions with the rated entity's management to understand its views on past performance as well as its future plans and strategies, besides the outlook on the industry. Some of the points assessed are:

- Experience of the promoter/management in the line of business concerned
- Commitment of the promoter/management to the rated entity
- Risk appetite of the promoter/management and risk mitigation plans
- Policies on leveraging, managing interest rates and currency risks
- Management's past success in introducing new projects and managing changes in the external environment
- Management's plans on new projects, acquisitions, expansion, etc.

Periodic interactions with the management help in ascertaining the shifts, if any, in the issuer's financial policies.

Assessment of Environmental, Social and Governance (ESG) Risks

The assessment of ESG risks by ICRA involves a broad range of considerations that pertain to the sustainability of an entity with focus on aspects that can have a material impact on its credit quality. While the E&S risks tend to be both sector-related as well as entity-specific and could be driven by external factors such as regulations or demographic changes, the G risks are largely entity-driven. The impact of the E&S risks on an entity's credit profile tends to be asymmetric. If the ESG risks are material but unmitigated, these generally translate into pulling down the rating, but generally the ratings are not pushed up even when the ESG context is favourable.

Environment (E) and Social (S) Risks

As this methodology highlights, while undertaking credit assessment of entities, ICRA seeks to incorporate all relevant credit considerations into its rating decisions, while taking a forward-looking view on the risks and the mitigating elements. The relevant credit considerations include (sometimes overtly, sometimes covertly) the E&S factors that could affect the rated entity/ transaction. While ICRA's analytical approach does not explicitly disaggregate these risks to assess their impact on the rating, these risks are often assessed broadly. Further, it is not always feasible to fully or precisely disaggregate the sub-components of E&S risks in credit analysis since these considerations often tend to overlap.

That said, the materiality of the E&S risks and the time horizon over which they are expected to crystallise differs widely across sectors and entities. In some cases, while the E&S risks could be material, but their effect on the credit profile may be muted because of other fundamental strengths of the entity. In other cases, the adverse impact of the E&S risks is expected to play out in the distant future, and hence these considerations do not necessarily weigh on the rating today—with the expectation that when these risks manifest in the distant future, the rated entity by then would possibly adapt itself by realigning its business model.

While evaluating the E&S risks, ICRA's objective is only to assess the direct and indirect risks that an entity faces and how it already is or is intending to mitigate the impact of such risks on its credit profile. As an example, ICRA only assesses whether an entity is exposed to physical climate risks or carbon transition risks such as those arising from changes in regulations or other environmental and social risks; and seeks to understand the various mitigation and adaptation approaches that the entity is implementing to mollify these risks.

Solar power producers contribute to the reduction in green-house gas emissions by being an alternative to power generation from fossil fuel-based sources. The policy, demographic and societal trends in favour of clean energy support the business profiles of solar power producers. At the same time, solar power producers are exposed to the risk of natural disasters and extreme weather conditions, which could damage the equipment – PV modules or transmission lines. Nonetheless, the issuers avail insurance against such risks including against loss of profits due to business interruption.

Given the large capacity targets set by the Government for the renewable energy sector, there is a large requirement of land for setting up such projects. There have been challenges in completing land acquisition, and social risks manifest when there are disagreements over compensation between the developers and the land owners. Further, there are competing claims that renewable power projects adversely impact the ecosystem. This apart, in case of solar power projects, the developers must also plan for the disposal/ recycling of the modules post decommissioning at the end of the project life. Thus, the solar power producers remain exposed to E&S risks arising from such considerations.

Governance Practices

Corporate governance remains a complex and an evolving subject. From a risk perspective, the same tends to hold as high an importance as an entity's business strategy. A sound corporate governance structure attempts to make clear the distinction of power and responsibilities between the Board of Directors and the management. The constitution of an entity's Board and the Board of Directors' participation in strategy formulation, besides the entity's adherence to legal and statutory compliance requirements are factored in during credit assessments. ICRA seeks to gain a qualitative understanding of an entity's commitment to following transparent and credible practices by the way its financial statements are reported, their level of disclosures, consistency in communication and the openness about sharing information during the credit rating exercise. Besides, the corporate group structure (whether simple or complex), the rated entity's related party transactions and instances of supporting group entities at the expense of debt holders are assessed.

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 cash flows for a solar power project remain sensitive to the level of electricity generation and tariff tied-up under the PPA along with the timeliness of collections from the counterparty, various scenarios are drawn up to assess the impact of key variables on the debt-servicing metrics. ICRA's rating approach also involves an assessment of the entity's management quality and governance practices. In addition to these considerations, an entity's credit rating may also be influenced by its ownership, the nature of linkages with its parent or group entities, degree of financial flexibility, the corporate legal structure, track record of operations and that of debt servicing, and vulnerability (if any) to discrete event risks. Further, ICRA draws comfort from strong coverage ratios and the presence of structural features like adequately-funded DSRA and restrictive covenants on additional debt and adequate dividend lock-up/ restricted payment triggers.

ANNEXURE

Summary of rating factors and an example to illustrate the key building blocks of a credit rating

		Strong			Comfortable			Adequate			Moderate			Weak		
Industry Risk	Industry Position															
Business Risk	Execution and Funding Risk															
	Availability of LT PPA and Cost competitiveness of Tariff															
	Counterparty Credit Risk															
	Generation Risk															
	Asset Diversification															
Financial Risk	Leverage															
	Coverage															
		Enhance					Support/ Neutral					Hinder				
	Diversification															
Do these factors enhance or hinder the credit profile?	Liquidity and Financial Flexibility															
	Currency Risk															
	Financial Policy															
	Management, Governance & Reporting															
		Very High				High				Moderate				Low		
Parent Support	Likelihood of Parent Support															
	Rating of Parent	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+	BB	BB-	B/ C category	
	Final Rating	**AAA**	**AA+**	**AA**	**AA-**	**A+**	**A**	**A-**	**BBB+**	**BBB**	**BBB-**	**BB+**	**BB**	**BB-**	**B/ C category**	

The above graphic is only for illustration purpose and does not represent a rating output from a formulaic model. The ratings assigned by ICRA are determined by Rating Committees based on both quantitative and qualitative considerations.

Glossary

Key Terms	Definition
Average Pooled Purchase Cost (APPC)	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
Cost Coverage Ratio for a discom	Annual Revenue Realisation (ARR) / Average Cost of Supply (ACS) ARR = Cash Collection inclusive of subsidy receipts / Units Sold ACS = Total expenditure / Units Sold
IPP	An IPP is a non-state utility, which owns and operates a power generation project for sale of power to discoms
Plant Availability Factor (PAF)	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
Preferential or Feed-in Tariff	Tariff determined by the SERC for sale of electricity generation from a renewable energy project to the state distribution utility
P90 PLF	The P90 estimate of generation is the generation which a solar plant is 90% likely to produce over an average year
Renewable Purchase Obligation	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
Renewable Energy Certificates	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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About ICRA Limited:

ICRA Limited was set up in 1991 by leading financial/investment institutions, commercial banks and financial services companies as an independent and professional investment Information and Credit Rating Agency.

Today, ICRA and its subsidiaries together form the ICRA Group of Companies (Group ICRA). ICRA is a Public Limited Company, with its shares listed on the Bombay Stock Exchange and the National Stock Exchange. The international Credit Rating Agency Moody's Investors Service is ICRA's largest shareholder.

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