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## RATING METHODOLOGY

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# Power Generation Projects Methodology

This rating methodology replaces the *Power Generation Projects Methodology* published in June 2021. This update clarifies the minimum project ownership interest of power generation project holding companies rated using this methodology. These updates do not change our methodological approach.

## Introduction

In this rating methodology, we explain our general approach to assessing credit risk of issuers in the power generation project sector globally, including the qualitative and quantitative factors that are likely to affect rating outcomes in this sector.

We discuss the scorecard used for this sector. The scorecard<sup>1</sup> is a relatively simple reference tool that can be used in most cases to approximate credit profiles in this sector and to explain, in summary form, many of the factors that are generally most important in assigning ratings to issuers in this sector. The scorecard factors may be evaluated using historical or forward-looking data or both.

We also discuss other considerations, which are factors that are assessed outside the scorecard, usually because the factor's credit importance varies widely among the issuers in the sector or because the factor may be important only under certain circumstances or for a subset of issuers. In addition, some of the methodological considerations described in one or more cross-sector rating methodologies may be relevant to ratings in this sector.<sup>2</sup> Furthermore, since ratings are forward-looking, we often incorporate directional views of risks and mitigants in a qualitative way.

As a result, the scorecard-indicated outcome is not expected to match the actual rating for each issuer.

<sup>1</sup> In our methodologies and research, the terms "scorecard" and "grid" are used interchangeably.

<sup>2</sup> A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

Our presentation of this rating methodology proceeds with (i) the scope of this methodology; (ii) the scorecard framework; (iii) a discussion of the scorecard factors; (iv) other considerations not reflected in the scorecard; (v) the assignment of issuer-level and instrument-level ratings; (vi) methodology assumptions; and (vii) limitations.

In Appendix A, we describe how we use the scorecard to arrive at a scorecard-indicated outcome. Appendix B shows the full view of the scorecard factors, sub-factors, weights and thresholds for fully amortizing and contracted structures, and Appendix C shows the full view of the scorecard factors, sub-factors, weights and thresholds for non-amortizing and partially contracted or non-contracted structures. Appendix D provides information on our assessment of off-taker credit quality and our use of credit estimates for power generation projects.

## Scope of This Methodology

This methodology applies to special purpose entities globally whose primary<sup>3</sup> business purpose is the generation of electric power and whose assets are financed on a non-recourse, project-finance basis.<sup>4</sup> The fuel used to power the asset is typically either a fossil fuel (e.g., coal or natural gas) or a renewable resource (e.g., solar, wind or municipal waste). Some power projects have a single power plant, and some have a portfolio of power generating assets. Given the non-recourse nature of a project's debt, lenders' rights under a default scenario are limited to the asset(s) of the special purpose entity. Moreover, the debt structures are typically highly structured, typically include limitations on additional indebtedness and business activities and usually offer lender protections that include a debt service reserve requirement and a payment waterfall structure.

Some projects covered under this methodology sell their generating capacity and output directly to a third party on a contractual basis for the full-term of the financing, while other issuers sell their generating capacity and output on a partial or non-contracted (or merchant) basis. Due to a degree of revenue certainty associated with fully contracted projects, lenders to such a project typically require full repayment per a predetermined debt repayment or amortizing schedule during the contract life. We refer to this as an amortizing structure. Conversely, partially or non-contracted projects are prone to high revenue volatility that does not align with a predetermined debt repayment schedule. These projects are typically structured with a 1% annual mandatory debt repayment requirement and an excess cash flow debt sweep requirement. We refer to this as a non-amortizing structure.

Some projects partially amortize with contracted cash flows, but are exposed to non-contracted or merchant tail risk for the remainder of their amortization. These projects would typically gravitate from the amortizing structure to the non-amortizing structure as they approach their merchant tail.

In most cases, projects are structured such that the special purpose entity borrower owns the power plant(s), which is pledged as collateral to lenders. Issuers that invest in projects but have corporate finance arrangements that, for instance, provide greater latitude to develop or invest in additional

This publication does not announce a credit rating action. For any credit ratings referenced in this publication, please see the ratings tab on the issuer/entity page on [www.moodys.com](http://www.moodys.com) for the most updated credit rating action information and rating history.

<sup>3</sup> The determination of an issuer's primary business is generally based on the preponderance of the issuer's business risks, which are usually proportionate to the issuer's revenues, assets, earnings or cash flows.

<sup>4</sup> This methodology also applies to power generation project holding companies, including entities with a minority ownership, typically of at least 15%, in one or more projects or in a project holding company, provided that (i) there are strong structural features in the transaction documents that clearly delineate a fixed or essentially fixed percentage of project cash flows that will flow to the minority owner or (ii) the minority holder has some meaningful influence or control over decisions at the operating company or companies. In these cases, a key component of the analysis is our assessment of the stand-alone credit quality of the operating company(ies) determined by a rating committee in accordance with this methodology.

power plants, are rated using our methodology for unregulated utilities and unregulated power companies.<sup>5</sup>

Credit ratings in the power generation project sector have spanned the credit spectrum, reflecting a wide variety of issuer-specific considerations, including asset diversification, location, and competitive and financial profiles. The off-take arrangements — whether the project sells its output on a fully contractual basis or incurs partial or full merchant exposure — are a primary determinant of the risk profile, which is the reason we use two scorecards.

Waste-to-energy issuers' cash flows are most often determined under contractual arrangements, and debt repayment is usually based on a pre-determined amortization schedule; thus, we typically use the amortizing scorecard in assessing credit risk for these projects.

### Scorecard Framework

This methodology includes two scorecards, each of which is composed of four weighted factors. Some of these factors comprise a number of sub-factors.

The scorecards also include five notching factors, which may result in upward or downward adjustments to the preliminary outcome, and a factor for off-taker risk that may constrain the rating. Exhibit 1 shows the scorecard used in assessing fully amortizing and contracted projects, and Exhibit 2 shows the scorecard used in assessing non-amortizing and partially contracted or non-contracted projects.

<sup>5</sup> A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

## EXHIBIT 1

**Power Generation Projects Sector Scorecard Overview:  
Fully Amortizing and Contracted Project Structures**

<b>Factor</b>	<b>Factor Weighting</b>	<b>Sub-factor</b>	<b>Sub-factor Weighting</b>
Predictability and Sufficiency of Cash Flows	30%	Quality and Diversity of Cash Flow Stream	25%
		Conditions for Contract Payments or Receipt of Revenues	5%
Competitiveness / Regulatory Support	15%	Competitiveness of Contracts Relative to Market / Regulatory Support	15%
Technical and Operating Profile	20%	Technology and Operating Performance	10%
		Sponsor Commitment	10%
Leverage and Coverage	35%	Debt Service Coverage Ratio (DSCR)	35%
<b>Total</b>	<b>100%</b>	<b>Total</b>	<b>100%</b>
<b>Preliminary Outcome</b>			
Liquidity	(notching factor)		
Structural Features	(notching factor)		
Refinancing Risk	(notching factor)		
Construction and Ramp-up Risk	(notching factor)		
Priority of Claim, Structural Subordination and Double Leverage	(notching factor)		
<b>Preliminary Outcome after Notching</b>			
Off-taker Risk	Potential Constraint		
<b>Scorecard-Indicated Outcome</b>			

Source: Moody's Investors Service

## EXHIBIT 2

**Power Generation Projects Sector Scorecard Overview:  
Non-amortizing and Partially Contracted or Non-contracted Project Structures**

Factor	Factor weighting	Sub-factor	Sub-factor weighting
Predictability and Sufficiency of Cash Flows	20%	Quality and Diversity of Cash Flow Stream	20%
Competitiveness / Regulatory Support	15%	Competitiveness of Project Assets / Regulatory Support	15%
Technical and Operating Profile	20%	Technology and Operating Performance	10%
		Sponsor Commitment	10%
Leverage and Coverage	45%	Project Cash from Operations / Adjusted Debt	15%
		Debt Service Coverage Ratio (DSCR)	15%
		Debt / EBITDA	15%
<b>Total</b>	<b>100%</b>		<b>100%</b>
<b>Preliminary Outcome</b>			
Liquidity	(notching factor)		
Structural Features	(notching factor)		
Refinancing Risk	(notching factor)		
Construction and Ramp-up Risk	(notching factor)		
Priority of Claim, Structural Subordination and Double Leverage	(notching factor)		
<b>Preliminary Outcome after Notching</b>			
Off-taker Risk	Potential Constraint		
<b>Scorecard-Indicated Outcome</b>			

Source: Moody's Investors Service

Please see Appendix A for general information relating to how we use the scorecard and for a discussion of scorecard mechanics. The scorecard does not include or address every factor that a rating committee may consider in assigning ratings in this sector. Please see the "Other Considerations" and "Limitations" sections.

## Discussion of the Scorecard Factors

In this section, we explain our general approach for scoring each scorecard factor or sub-factor, and we describe why they are meaningful as credit indicators.

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### **Factor: Predictability and Sufficiency of Cash Flows** **(30% Weight for Fully Amortizing and Contracted Structures)** **(20% Weight for Non-amortizing and Partially Contracted or Non-contracted Structures)**

#### **Why It Matters**

Power projects are typically structured as special purpose entity funding vehicles that rely on project-level operating cash flow as the primary source for debt repayment. As such, a critical credit factor in assessing credit ratings is the certainty and sufficiency of the future project-level operating cash flow stream. Our assessment includes consideration of existing contractual arrangements, counterparty creditworthiness, power market fundamentals, fuel supply risk and operating performance.

This factor has a 30% weight for fully amortizing and contracted structures. For these projects, which are often structured with very high debt levels relative to cash flow, the degree of cash flow sufficiency and predictability as well as the strength of the contractual and operational elements that lead to this predictability over time are extremely important to the project's ability to service its debt. When there is a high degree of sufficiency and predictability of cash flows, we can have more confidence that projected cash flows can be attained.

This factor has a 20% weight for non-amortizing and partially contracted or non-contracted structures, and the 10% differential is allocated to the leverage and coverage sub-factors. Due to their typically much greater exposure to market dynamics affecting the price of power sold and the cost of generation (principally fuel), these projects generally have less stable and less predictable cash flows. Given a lower ability to predict what long-term cash flows will be, the project's leverage and the strength of coverage take on greater significance in our credit analysis.

An important consideration in the assessment of a contracted project's cash flow predictability is whether the contractual arrangements have conditionality associated with the ongoing receipt of payment and, if so, the degree to which such conditionality may impact cash flows. This sub-factor has a 5% weight and does not apply to non-amortizing structures, because they typically have no or only partial contracts/hedges in place.

#### **How We Assess It for the Scorecard**

##### **QUALITY AND DIVERSITY OF CASH FLOW STREAM:**

We assess the stability or volatility of a project's revenue stream by considering the extent of contractual support underpinning the revenues and the diversity of revenue sources. Contractual support ranges from fully contracted off-take arrangements with multiple counterparties through the life of the financing to those that have no contracts or hedges in place, resulting in full exposure to the different commodity markets that affect the cost of fuel purchased, the price of power sold, or (typically) both. We refer to such market-exposed projects as merchant projects. For contracted projects, we typically also consider the credit quality of the off-taker. Please see Appendix D for information on assessing off-taker credit quality and our use of credit estimates.

Projects with contractual support will almost always score stronger in this sub-factor than projects with merchant exposure because cash flows are significantly less volatile for the former.<sup>6</sup> The scoring of this sub-factor for contracted projects is based on our qualitative assessment of a number of issues, including contract term, off-taker's credit profile, the pass-through nature of project costs (including fuel, operating and maintenance costs, or O&M costs) and the project's operating history.

Sub-factor scoring for partially or non-contracted projects is typically Ba or lower due to the inherent volatility and uncertainty relating to revenue determined by market prices. Considerations for sub-factor scoring include an assessment of the project's regional location, short or intermediate term hedged positions and the dispatch profile.<sup>7</sup> While a somewhat greater degree of unhedged cash flows can be tolerated if some of the project's revenues are derived from established capacity markets, a base-or-intermediate load generation facility reliant on energy payments may score lower than a peaking asset for which a stable level of capacity payments represent a higher percentage of net cash flows.

In the context of renewable projects, an additional crucial driver for the predictability of cash flows is the reliability or volatility of the renewable resource. Wind, solar and even some hydro projects are an intermittent resource, and the volume of electricity and cash flow is subject to resource risk. In some regions, renewables are also a seasonal resource. Please see the discussion of "Factor: Leverage and Coverage" for more details on these scenarios.

In assessing the predictability of cash flows for a renewable project, we generally also consider the impact of regulations and potential changes in regulations. While these aspects are considered more specifically in the following factor, they may ultimately affect reliability of cash flows. Regulations and subsidies may drive stable, reliable cash flow; however, changing regulations could introduce considerable volatility.

#### **CONDITIONS FOR CONTRACT PAYMENTS OR RECEIPT OF REVENUES:**

We assess this sub-factor qualitatively, typically by considering the terms and conditions of the project's off-take contract(s) and by considering any technological, operational or logistical impediments to the project's fulfilling its contractual obligations in order to receive payments from the off-taker. For example, we may consider fuel supply and delivery arrangements (e.g., contracted pipeline capacity) or any wheeling arrangements needed for the project to deliver power to the off-taker.

<sup>6</sup> One exception might be for projects contracted to sell power to an entity whose credit profile has deteriorated markedly. In these cases, we would also typically consider the cash flow and predictability of cash flows should the project need to sell its power on a merchant basis. Depending on the cost profile of the project, it may not be well positioned.

<sup>7</sup> The dispatch profile refers to the expected output and hours of operation of the plant based on the load (demand) in the regional power market and the plant's marginal cost of generation relative to other generators in the regional market.

FACTOR:

**Fully Amortizing and Contracted Project Structures**

Predictability and Sufficiency of Cash Flows (30%)

Sub-factor	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
Quality and Diversity of Cash Flow Stream	25%	Highly predictable, fully contracted cash flow from off-taker(s) with credit quality of at least Aa3-equivalent, and contracts extend beyond the term of the financing. AND Contracts are structured to directly pass through all commodity costs, operating and maintenance (O&M) costs, environmental costs and capex without material conditions. Contracts are take-or-pay. No fuel supply/resource risk.	Highly predictable, fully contracted cash flow from one or more off-takers with credit quality of at least A3-equivalent, and contracts extend for the full term of the financing. AND Contracts are structured to pass-through all commodity costs and O&M costs and include pass through of material environmental costs, including capex, due to change in regulation. Contracts are take-or-pay. No fuel supply/resource risk. OR Highly predictable, fully contracted cash flow for the full term of the financing with off-taker(s) of at least Baa3-equivalent credit quality for which the project is essential to its power supply resource (or project can easily be re-contracted on equivalent terms). AND Five or more years of strong operating and financial performance.	Highly predictable fully contracted cash flow from one or more off-takers with credit quality of at least Baa3-equivalent, and contracts extend for the full term of the financing. Contracts typically have price escalators tied to inflation. Low fuel-supply/resource risk. OR Highly predictable, fully contracted cash flow for the full term of the financing with off-taker(s) of Ba-equivalent credit quality for which the project is essential to its power supply resources (or project can easily be re-contracted on equivalent terms). AND Five or more years of strong operating and financial performance.	At least 50% of expected cash flow stream is based on contracted or hedged cash flow over the medium term (3-5 years) but may not extend for the full financing term. Unhedged cash flow is expected to exhibit relatively low year-to-year volatility. Greater degree of unhedged cash flow can be tolerated if such cash flows are derived from well-established capacity markets. Some fuel-supply/resource risk. OR Highly predictable, fully contracted cash flow for the full term of the financing with off-taker(s) of B1-equivalent credit quality for which the project is essential to its power supply resources (or project can easily be re-contracted on equivalent terms). AND Five or more years of strong operating and financial performance.	Less than 50% of expected cash flow is based on contracted or hedged cash flow over the medium-or-short-term. Unhedged cash flow is vulnerable to year-over-year volatility. High fuel-supply/resource risk. OR Cash flows, irrespective of contractual arrangements, are marginally sufficient to meet debt obligations.	Cash flows, irrespective of contractual arrangements, likely to be insufficient to meet debt obligations.	Cash flows, irrespective of contractual arrangements, are substantially insufficient to meet debt obligations.

FACTOR:

**Fully Amortizing and Contracted Project Structures**

Predictability and Sufficiency of Cash Flows (30%)

Sub-factor	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
Conditions for Contract Payments or Receipt of Revenues	5%	No conditions exist that would cause revenues not to be paid.	Revenue levels are highly probable under virtually all scenarios.	Conditions for payments are probable under most scenarios. Debt service payments are largely based on receipt of capacity payments or reservation charges based on the operating performance of the plant and the terms of the contract.	Conditions for payment can be less predictable due to the terms of the contract based on the operating history or expected performance of the plant.	Conditions for payment are less certain. Receipt of revenues may have greater volatility due to technological risks or operational risks, or may depend on factors beyond the control of the project.	Receipt of revenues is highly uncertain. Receipt of revenues may experience material volatility due to technological or operational challenges, or may highly depend on factors beyond the control of the project.	Receipt of revenues is unlikely.

Source: Moody's Investors Service

FACTOR:

**Non-Amortizing and Partially Contracted or Non-Contracted Project Structures**

Predictability and Sufficiency of Cash Flows (20%)

Sub-factor	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
Quality and Diversity of Cash Flow Stream	20%	Highly predictable, fully contracted cash flow from off-taker(s) with credit quality of at least Aa3-equivalent, and contracts extend beyond the term of the financing.  AND Contracts are structured to directly pass through all commodity costs, operating and maintenance (O&M) costs, environmental costs and capex without material conditions. Contracts are take-or-pay. No fuel supply/resource risk.	Highly predictable, fully contracted cash flow from one or more off-takers with credit quality of at least A3-equivalent, and contracts extend for the full term of the financing.  AND Contracts are structured to pass through all commodity costs, O&M costs and include pass-through of material environmental costs, including capex, due to change in regulation. Contracts are take-or-pay. No fuel supply/resource risk.  OR Highly predictable, fully contracted cash flow for the full term of the financing with off-taker(s) of at least Baa3-equivalent credit quality for which the project is essential to its power supply resource (or project can easily be re-contracted on equivalent terms).  AND Five or more years of strong operating and financial performance.	Highly predictable fully contracted cash flow from one or more off-takers with credit quality of at least Baa3-equivalent, and contracts extend for the full term of the financing. Contracts typically have price escalators tied to inflation. Low fuel-supply/resource risk.  OR Highly predictable fully contracted cash flow for the full term of the financing with off-taker(s) of Ba-equivalent credit quality for which the project is essential to its power supply resources (or project can easily be re-contracted on equivalent terms).  AND Five or more years of strong operating and financial performance.	At least 50% of expected cash flow stream is based on contracted or hedged cash flow over the medium-term (3-5 years) but may not extend for the full financing term. Hedged cash flow is expected to exhibit relatively low year-to-year volatility. Greater degree of unhedged cash flow can be tolerated if such cash flows are derived from well-established capacity markets. Some fuel-supply/resource risk.  OR Highly predictable fully contracted cash flow for the full term of the financing with off-takers of B1-equivalent credit quality for which the project is essential to its power supply resources (or project can easily be re-contracted on equivalent terms).  AND Five or more years of strong operating and financial performance.	Less than 50% of expected cash flow is based on contracted or hedged cash flow over the medium or short term. Unhedged cash flow is vulnerable to year-over-year volatility. High fuel-supply/resource risk.  OR Cash flows, irrespective of contractual arrangements, are marginally sufficient to meet debt obligations.	Cash flows, irrespective of contractual arrangements, likely to be insufficient to meet debt obligations.	Cash flows, irrespective of contractual arrangements, are substantially insufficient to meet debt obligations.

Source: Moody's Investors Service

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**Factor: Competitiveness / Regulatory Support (15% Weight for Each Structure)****Why It Matters**

Competitiveness and regulatory support are important for amortizing and non-amortizing power projects. Even if contracted, the value of the project to its off-taker is directly related to how competitive the project is relative to alternative sources for the energy and services the project provides. If the contract is materially above the market based on the contract terms and type of energy service the project provides (or even based on its cost relative to spot market prices), the off-taker has less incentive to work with the project in a constructive manner to resolve any operational or technical problems that arise, or to refrain from claiming a technical default under the contract. Similarly, if there is limited regulatory support, for instance if the project sells to a utility whose regulator does not permit the pass-through of project costs to ratepayers, the off-taker has greater incentive to find ways to exit the contract. Regulators may incentivize the purchase of power from certain types of technologies, for instance renewable energy, or they may create disincentives for certain technologies, for instance by imposing stricter caps on power plant emissions.

For partially or non-contracted projects, competitiveness is directly related to the ability to earn a margin and generate cash flow. When the plant's output is unhedged, the impact of relative competitiveness is typically immediate; for hedged projects, it may be deferred until the hedges run off.

**How We Assess It for the Scorecard**

We generally consider a number of aspects in determining a project's competitive profile, with particular emphasis on cost structure relative to regional peers. In assessing the competitive profile of a power generating project that has already contracted its future capacity and output, we consider contracted pricing terms relative to market pricing levels (for replacement contracts or for power in the spot markets) to determine cash flow impact resulting from contract termination.

For non-amortizing and partially or non-contracted structures, other considerations are taken into account. When assessing competitive profile and cost structure, we typically assess geographic diversification and project capacity factors, heat rates and fuel mix. Geographically diverse portfolios typically score better for this factor than single asset projects. Other considerations in determining competitive profile include obstacles to entry for new builds and regional power demand and supply characteristics. For example, the assessment of the competitive position of asset(s) located in a particular city or region would generally take into consideration potential regional obstacles that could limit new construction. Moreover, merchant electric power price levels in oversupplied regions are typically lower than those in more balanced or constrained markets.

We also incorporate environmental risks into our credit analysis. Generally, the impact of environmental policy varies, depending on the generation technology, geographic location and the regulatory landscape. Where regulators have focused on emissions of carbon dioxide, sulfur dioxide, nitrous oxide or mercury, coal-fired plants have been most vulnerable, followed by oil and gas-fired plants. Where regulations have favored green energy, all fossil-fuel-fired plants have faced displacement by renewable generation and have needed to compete for the portion of power demand that is not satisfied by preferred technologies.

For renewable generation projects, assessing the economic competitiveness of the contract or project relative to the market may have additional dimensions, because these contracts may meet the off-taker's regulatory requirements or strategic initiatives. We typically assess the economic

competitiveness of a contract relative to similar contracts that provide comparable overall benefits to the off-taker. Many renewable projects are not competitive without some form of regulatory support from a national or regional government. Moreover, many wind and solar projects benefit from must-take contracts with utility counterparties, where the utility is obligated to take and pay for whatever power is produced by the project.

Governmental or regulatory support can come in many forms, such as cash grants and production tax credits or less direct forms, including high feed-in tariffs.<sup>8</sup> Regardless of the approach, all are intended to foster greater participation in renewable resources in an effort to advance public policy objectives. Technological advances and operational efficiencies have lowered the construction cost associated with wind and solar resources such that the subsidy needed to be competitive with traditional market-based resources has declined.

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<sup>8</sup> Feed-in tariffs are regulatory mechanisms whereby renewable generators receive a premium when the wholesale power price is lower than a reference price.

FACTOR:

**Fully Amortizing and Contracted Project Structures**

Competitiveness / Regulatory Support (15%)

Sub-factor	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
Competitiveness of Contracts Relative to Market / Regulatory Support	15%	<p>Terms of the contracts (for both conventional and renewable projects) will always be very competitive to prevailing market prices. No impact on expected revenue stream following termination of contract(s).</p> <p>AND</p> <p>Negligible exposure to meaningful environmental risks.</p>	<p>Terms of the contracts (for both conventional and renewable projects) will always be competitive to prevailing market prices during term of financing. Little, if any, impact is expected on revenue stream following termination of contract(s).</p> <p>AND</p> <p>Modest exposure to environmental risks that are not expected to be material to credit quality.</p>	<p>Terms of the contracts are expected to be at or near market prices during the term of the financing. Some revenue impact could occur if contract(s) is terminated, but revenue erosion is expected to be relatively modest. Emerging exposure to environmental risks may have credit implications over the medium term (3-5 years) but there is meaningful uncertainty whether financial implications will be material.</p> <p>For renewable projects, strong regulatory support from central government, regional jurisdiction or rate-setting authority. There is little risk of a change in law or of supportive regulation eroding over time. There is good history of contract sanctity or a legal protection against subsidy reduction. The price for renewable energy is at or near prices for other renewable energy in the same jurisdiction.</p>	<p>Terms of the contracts are moderately above market prices for the foreseeable future. Loss of contract(s) would have a temporary impact on revenues, but project should be able to secure replacement revenues in a reasonably short time frame. Emerging exposure to environmental risks could be material to credit quality over the medium term (3-5 years) but less likely over the near term.</p> <p>For renewable projects, generally supportive regulatory framework for renewable generation from central government, regional jurisdiction or rate-setting authority, but support could erode over time due to a change in law or supportive regulation. The price for renewable energy is slightly above prices for other renewable energy in the same jurisdiction.</p>	<p>Terms of the contracts are significantly above market prices for the foreseeable future. Termination of contract(s) would likely result in severe cash flow erosion, and replacement contract(s), if secured, would likely be on substantially less favorable terms. Termination of contract(s) would make timely payments of operating costs and debt service difficult. Failure to obtain replacement contract(s) could result in a payment default in a two-year time frame.</p> <p>OR</p> <p>Immediate, elevated exposure to environmental risks that have material financial implications. For renewable projects, regulatory framework is less supportive. Or, if currently supportive, this regulatory support has been challenged or is vulnerable to change that could have a negative impact on the economics of the project. Price competitiveness of the project relative to other renewable energy sources is weak.</p>	<p>Terms of the contracts are substantially above market prices for the foreseeable future. Termination of contract(s) would result in an immediate loss of cash flow, with the prospect of securing any replacement extraordinarily difficult; or termination of contract(s) would likely result in a payment default within a one-year time frame.</p> <p>OR</p> <p>Elevated credit exposure to environmental risks challenges financial viability.</p> <p>For renewable projects, regulatory environment is unstable or part of an emerging market with little history or transparency with respect to contract sanctity or legal protections.</p>	<p>Terms of the contracts are being actively challenged. High risk of abrogation of a contract affecting material project cash flows.</p>

FACTOR:

**Non Amortizing and Partially Contracted or Non-Contracted Project Structures**

Competitiveness / Regulatory Support (15%)

Sub-factor	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
Competitiveness of Project Assets / Regulatory Support	15%	Highly competitive portfolio of geographically diverse assets. AND Expected to remain the lowest all-in cost structure in the respective regions. AND Very high obstacles to entry will persist. AND Negligible exposure to meaningful environmental risks.	Very competitive portfolio of geographically diverse assets. AND Among the lowest all-in cost structure of assets in the respective regions. AND High obstacles to entry will persist. AND Very modest exposure to environmental risks that are not expected to be material to credit quality.	Geographically diverse portfolio of assets that are competitive on balance, or a very competitive single asset. Asset(s) generally among the lowest all-in cost structure in the region. Currently, obstacles to entry exist. Operates where significant regional supply constraints exist, or may have regulatory or legislative protection for extended period of time. Modest exposure to environmental risks with potential credit implications over the medium term (3-5 years) but there is uncertainty whether financial implications will be material.	Generally competitive asset(s). Asset(s) currently among the lower all-in cost structures in the region, but competitive position could be challenged by new entrants or by changes in laws/regulations. Obstacles to entry exist, but could decline over time. Operates in a region where some generating supply constraint exists, or has some current regulatory or legislative protection in its marketplace for an intermediate-term time frame. Emerging exposure to environmental risks that could be material to credit quality over the medium term (3-5 years) but less likely over the near term.	Competitive position is weak. Ability to operate is highly dependent on certain legislative or regulatory protections in place, which could erode over time. OR Obstacles to entry exist, but are fairly weak. New entrant could make asset class vulnerable to being shut down or displaced. Asset(s) operates in region that has a degree of excess generating supply for the next several years. OR Elevated exposure to environmental risks that have material financial implications.	Very weak competitive position. Operates in a region that has excessive generating supply. OR Asset(s) highly vulnerable to being permanently shut down. OR Immediate elevated credit exposure to environmental risks challenges financial viability.	Restructuring likely needed to improve weak competitive position.

Source: Moody's Investors Service

## Factor: Technical and Operating Profile (20% Weight for Each Structure)

### Why It Matters

A power generation project typically receives revenues only if it is available and capable of operating. As a result, another important rating consideration involves an assessment of the project's operating performance and technology. Sponsor<sup>9</sup> commitment is another important component of credit quality, because a strong, engaged project sponsor typically has an ability to provide the project with a financial or operational lifeline in order to avoid a covenant violation or a default.

### How We Assess It for the Scorecard

#### TECHNOLOGY AND OPERATING PERFORMANCE:

Power generation projects range from those with a low operating risk profile, which typically use simple, commercially proven technology with minimal moving components, to those with high operating risks and typically complex technology requiring specialized skills to operate. We assess where the power generation project sits on this risk continuum from a technological and operational perspective. We usually consider historical operating performance, project availability factors, as well as forced outage rates. We also consider whether the project has entered into a long-term service agreement (LTSA) with a reputable vendor and also assess the performance support and warranty periods provided by the original equipment manufacturer (OEM). An LTSA typically commits an OEM to provide maintenance services for the equipment they manufactured, and it demonstrates a long-term commitment to proper equipment maintenance. For sponsors that are not experienced operators, we consider whether they have entered into an O&M agreement with a third party and the experience and reputation of the operator.

#### SPONSOR COMMITMENT:

The non-recourse nature of project debt results in lenders having no recourse or limited recourse to the sponsors. Sponsors have an economic interest in the project in the form of future cash flow distributions, which may create incentives to provide incremental financial support in order to protect these distributions. However, we typically consider that sponsors will be willing to walk away from a project when economic incentives disappear. For instance, if future cash flows are unlikely to be sufficient to pay both future debt service and distributions to sponsors, the sponsor typically has no economic incentive to provide assistance in the form of an additional equity injection.

In assessing the sponsor's economic incentives, we often consider their invested equity, the discounted value of expected future distributions to sponsors or, where available, the market value of the project relative to its debt. Discounted cash flow analysis is more likely to be straightforward for contracted projects than for non-contracted projects, because the future cash flows of the latter are harder to predict, requiring scenario analysis. In summary, the greater the economic value of the investment to the sponsor, the more likely the sponsor is to provide financial support to the project. We also consider the ability of the sponsor to provide support (its credit quality), and we differentiate sponsor ownership between strategic and financial investors. Strategic investors typically have a longer-term investment horizon relative to financial investors, and they are generally more likely to protect their investment should a need arise.

The timing and certainty surrounding the funding of the equity in a project is also a key part of our analysis. If equity is not injected at financial close, the rating could be negatively affected if the project does not have equity commitments that are provided by highly rated sponsors or supported by letters of credit issued by highly rated banks.

<sup>9</sup> The sponsor is typically the developer of the project; thus, an owner that takes responsibility for management of the project in its construction and operational phases. Where there are multiple owners, some owners may have a more passive role, or owners may co-manage the project.

FACTOR:

**Fully Amortizing and Contracted Structures, and Non-Amortizing and Partially Contracted or Non-Contracted Structures**

Technical and Operating Profile (20%)

Sub-factor	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
Technology and Operating Performance	10%	Simple, commercially proven technology/process with minimal moving components. AND Revenues and cash flow are not impacted by operational performance. OR Long-term O&M contract with highly creditworthy and experienced operator; and O&M contract extends to debt maturity and fully insulates project from operating issues.	Simple, commercially proven technology/process with few moving components or well diversified portfolio of operating plants. LTSA or warranties/performance guarantees from creditworthy OEM are in place for the term of the financing. AND Operating history at plant and at projects using similar technology has been well above industry averages; O&M contract with a creditworthy and experienced operator; and O&M contract extends to debt maturity and includes significant protection against operating problems.	Commercially proven technology/process that is well understood and considered standard for the industry. LTSA or warranties/performance guarantees from creditworthy OEM are in place for a number of years of the project's life. AND Reliable operating history at plant and at projects using similar technology. Long-term O&M contract with a creditworthy, recognized operator. O&M contract provides material incentive for strong operating performance, including liquidated damages.	Commercially proven technology/process with several complex elements requiring specialized skills to operate and maintain. OR Has experienced periodic operating challenges that may reoccur. O&M contract with recognized operator provides some incentive for strong operating performance.	Most of technology is considered to be proven, but certain elements are untested or have limited operating history. OR Commercially proven technology/process that has experienced significant operating challenges that are likely to persist. O&M contract with less experienced operator. O&M contract does not include material incentive for strong operating performance.	Technology is unproven and untested with very limited operating track record, or technology has high obsolescence risk. OR Commercially proven technology/process that has experienced material operating challenges that are highly likely to continue. OR O&M contractor has limited experience or has operated the plant below expectations for a meaningful period. O&M contract provides little benefit to the plant.	Technology is unproven and untested with no operating track record or unlikely to perform as expected. OR Commercially proven technology/process that has experienced irreversible operating challenges. OR O&M contractor has no material experience or has operated the plant substantially below expectations for an extended period. O&M contract provides no benefit to the plant.
Sponsor Commitment	10%	Financial support from a strategic sponsor with a very strong credit profile is certain should operating or financial problems occur.	Financial support from a strategic sponsor with a strong credit profile is highly likely should operating or financial problems occur.	Sponsor is a strategic or financial investor with a moderately strong credit profile and meaningful economic incentive and financial resources to support its investment.	Sponsor is typically a financial investor with a moderately strong credit profile and adequate economic incentive and financial resources to support its investment.	Sponsor has limited economic incentive or financial resources to support its investment.	Sponsor has little to no economic incentive or financial resources to support its investment.	Sponsor has no economic incentive or financial resources to support its investment.

Source: Moody's Investors Service

**Factor: Leverage and Coverage**  
**(35% Weight for Fully Amortizing and Contracted Structures)**  
**(45% Weight for Non-amortizing and Partially Contracted or Non-contracted Structures)**

**Why It Matters**

Leverage and coverage measures are critical indicators of a power generation project's ability to service debt and its long-term financial viability. A robust debt service coverage ratio throughout the life of the project debt usually indicates a greater tolerance for occasional variations in operational performance as well as greater economic incentives for the sponsor. For non-amortizing, non-contracted projects, a low ratio of debt to earnings before interest, taxes, depreciation and amortization (EBITDA), a robust debt service coverage ratio and a strong ratio of project cash from operations to adjusted debt indicate a greater ability to adapt to changes in the power markets and the competitive environment.

**How We Assess It for the Scorecard**

For financing structures where debt is fully amortizing during the term of the project's off-take agreement, we use the debt service coverage ratio (DSCR).

Partially amortizing and non-amortizing financing structures typically result in substantial refinancing risk. Hence, for these structures, given the substantial refinancing risk for the final balloon principal repayment, the DSCR is a less powerful metric in assessing the ability of the project to support its debt. We use two additional financial metrics that measure or estimate the level of cash flow relative to the level of debt. The ratio of project cash from operations to adjusted debt is an indicator of a project company's ability to repay its debt. It is a measure or estimate of cash flow generation to total adjusted debt. The ratio of debt to EBITDA is an indicator of debt serviceability and leverage. The ratio is commonly used in this sector as a proxy for comparative financial strength.

**PROJECTION SCENARIOS AND RELEVANT PERIOD:**

In general, the focus of our assessment of leverage and coverage financial metrics is forward-looking. We generally use cash flow projections based on our own assessment of the most likely financial and operating parameters and sensitivities. We also typically consider a number of downside or sensitivity scenarios to test the resiliency of the project's cash flows. Our central scenario and sensitivities may be informed by third-party technical or market consultants, and they may be different from the owner's or sponsor's projections. For projects that have a track record, historical performance generally has a strong influence on our view of likely future results, unless there is a material change in the project's operating parameters or market dynamics. As a result, historical results are among the drivers that can cause changes to our central scenario and downside or sensitivity scenarios over time.

The scorecard ratios are calculated on a forward-looking basis for the relevant projection period. For fully amortizing projects, the relevant projection period is a forward-looking period through the life of the debt. For non-amortizing projects, whose cash flows are typically more vulnerable to year-over-year fluctuations, the relevant forward-looking projection period is typically the annual average over the next three years, although we also consider longer-term financial performance. For projects in construction, the relevant period is a three-year period starting with the commencement of commercial operations. For averaging the financial ratios over the relevant period, we sum the numerator for each annual period and divide by the sum of the denominator for each annual period.

### *Projection Scenarios for Renewable Energy Projects*

We typically consider probability scenarios in the range of P50 to P99<sup>10</sup> established by statistical modeling techniques for the renewable energy resource. The selection of the probability scenario that is used in our project base case is typically based on several considerations, including the presence (or absence) and quality of historical operating data, the track record of the equipment and technology used by the project, site-specific data, and the track record and methodological approach of the resource consultant.

When meaningful operating data are present, they are typically a primary driver for our base case scenarios, unless the project's operations are undergoing material change. In assessing the track record, we usually consider the demonstrated level and stability, intra-year and over time, of both the resource and the project's output.

Solar photovoltaic power projects have demonstrated steadier generation output on a year-over-year basis than their renewable energy peers, and the difference in output related to P90 and P50 scenarios is often fairly small. As a result, the base case probability scenario considered for solar projects could be at the P50 level, including for greenfield projects. Where there is proven technology from reliable manufacturers and a solid track record for the solar resource in the region, we may use a P50 or near P50 scenario as the base case. However, where the resource has shown volatility (which may be indicated by wider differentiation between the consultant's P50 and P90 scenarios), we are more likely to use a P90 scenario as base case.

For greenfield wind, we would typically use a one-year P90 base case scenario for diversified wind projects<sup>11</sup> and a one-year P95 base case for non-diversified projects. We would also typically use a P90 base case scenario for hydro. We may in some cases use as a base case a lower P-level scenario or a scenario based on an average P-level over a somewhat longer period if the wind/hydro resource data are robust<sup>12</sup> and show low volatility.

For all types of renewables projects, greenfield and operating, the base case probability scenario may be P90 or higher for projects where the projected or experienced volatility is high, the technology or equipment is less proven, the data supporting the renewable resource consultant's projections are limited or inconsistent, or the operating track record does not support a lower P-level scenario.

<sup>10</sup> Given the natural variability of the natural resource (e.g., wind speeds) and various loss factors, the expected amount of power generation over a given period can be characterized by a probability distribution developed from the supporting data using established statistical modeling techniques. Our expectation of the ability of wind, solar or hydro projects to generate sufficient revenues to service debt is highly dependent on the level of confidence that the power project's generation output will meet or exceed a certain modeled level. P90 refers to the 90th percentile, meaning that the technical advisor is opining that there is a 90% probability that the power project's output will meet or exceed this level, and a 10% probability that the power output will be lower than this level. We note there is a distinction between a one-year P-level and a 10-year P-level. One-year P90 is more conservative and represents a case where in any given year, the technical advisor is ascribing a 90% probability that actual production will meet or exceed the modeled amount (and a 10% chance it will be lower). In a 10-year P90 scenario, the average annual energy production over a 10-year period has a 90% probability of exceeding projections, with consequently lower probability that that level will be reached in any particular year. We typically consider a variety of scenarios, and we may vary from the following guidance based on project-specific considerations. For example, we may consider the technical advisor's track record of estimating projects in that region, the robustness of available data in a particular region relative to other regions, or the overall level of competition among technical advisors to win renewable resource mandates.

<sup>11</sup> Diversified wind projects have wind farms in several uncorrelated wind regimes.

<sup>12</sup> Robust data would typically include site-specific data as well as many years of reliable data from nearby weather stations.

**DEBT SERVICE COVERAGE RATIO:**

The numerator is consolidated cash flow available for debt service (CFADS), and the denominator is consolidated scheduled interest and principal payment.<sup>13</sup>

CFADS is equal to cash flow from operations (after tax and working capital changes, but before interest expense) less major maintenance capex plus or minus scheduled transfers from/to major maintenance reserves. Scheduled interest and principal repayment for fully amortizing projects equals mandatory cash interest and principal payments required to be paid in the relevant period, as defined in the project bond indenture of loan agreement. Principal repayment for non-amortizing projects is typically equal to 1% of the initial outstanding balance annually and excludes any required cash sweeps.

Major maintenance capex are expenditures needed to maintain the ongoing operations of the plant and are needed to keep the plant in good working order for the life of the transaction. In the DSCR, major maintenance capex is deducted, but not any extraordinary, discretionary or growth capex.

DSCR is an indicator of a project's ability to pay its mandatory debt service requirements. As non-amortizing financing structures typically only require a 1% annual principal amortization, debt service coverage is typically stronger for non-amortizing structures than for amortizing structures.

**PROJECT CASH FROM OPERATIONS TO ADJUSTED DEBT:**

The numerator is cash flow from operations (after taxes and interest expense) less major maintenance capex plus or minus scheduled transfers from/to major maintenance reserves, and the denominator is total adjusted debt.<sup>14</sup> Total adjusted debt equals total debt outstanding at the end of the period, adjusted for leases.<sup>15</sup>

**DEBT TO EBITDA:**

The numerator is total adjusted debt, and the denominator is EBITDA.<sup>16</sup>

<sup>13</sup> For minority interests in projects, the numerator of the DSCR ratio is the proportionate share of the operating company's CFADS, and the denominator of the ratio is the sum of the proportionate share of the operating company's debt service (including any debt service for obligations at any intermediate holding company) plus 100% of the minority holding company's debt service. This approach to calculating metrics may also inform our analysis of non-minority partially owned projects. Please also see additional guidance in the section on notching factors. In cases where the proportionate share of the operating company's CFADS is unavailable, we may use cash distributions from the operating company to the holding company as a proxy. In cases where the minority owner's economic interest in the operating company (e.g., the minority owner's proportionate share of cash distributions) is different from its ownership interest, the proportionate share of CFADS and debt service is based on the economic interest.

<sup>14</sup> For minority interests in projects, the numerator of the Project CFO/Debt ratio is the proportionate share of the operating company's CFO, and the denominator of the ratio is the sum of the proportionate share of the operating company's total adjusted debt (including any debt at any intermediate holding company) plus 100% of the minority holding company's debt. This approach to calculating metrics may also inform our assessment of non-minority partially owned projects. Please also see additional guidance in the section on notching factors.

<sup>15</sup> For our approach to adjusting leases, please see our cross-sector methodology that discusses our financial statement adjustments used in the analysis of non-financial corporations. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

<sup>16</sup> For minority interests in projects, the numerator of the ratio is the sum of the proportionate share of the operating company's total adjusted debt (including any debt at any intermediate holding company) plus 100% of the minority holding company's debt. The denominator is the proportionate share of the operating company's EBITDA. This approach to calculating metrics may also inform our assessment of non-minority partially-owned projects. Please also see additional guidance in the section on notching factors.

FACTOR:

**Fully Amortizing and Contracted Project Structures**

Leverage and Coverage (35%)

Sub-factor	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
Debt Service Coverage Ratio*	35%	≥ 3.5x	1.9x - 3.5x	1.4x - 1.9x	1.2 - 1.4x	1.1 - 1.2x	1.0 - 1.1x	< 1.0x

\* The numerator is consolidated cash flow available for debt service (CFADS), and the denominator is consolidated scheduled interest and principal payment. For the linear scoring scale, the Aa endpoint value is 10x. A value of 10x or better equates to a numeric score of 1.5. The Ca endpoint value is 0x. A value of 0x or worse equates to a numeric score of 20.5.

Source: Moody's Investors Service

FACTOR:

**Non-Amortizing and Partially Contracted or Non-Contracted Project Structures**

Leverage and Coverage (45%)

Sub-factor	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
Project Cash from Operations / Adjusted Debt*	15%	≥ 80%	46% - 80%	25% - 46%	10% - 25%	4% - 10%	2% - 4%	< 2%
Debt Service Coverage Ratio**	15%	≥ 14x	8x - 14x	4x - 8x	2x-4x	1x - 2x	0.5x - 1x	< 0.5x
Debt / EBITDA***	15%	≤ 1.5x	1.5x - 2.5x	2.5x - 3.5x	3.5x - 6.0x	6.0x - 9x	9x - 13x	> 13x

\* The numerator is cash flow from operations (after taxes and interest expense) less major maintenance capex plus or minus scheduled transfers from/to major maintenance reserves, and the denominator is total adjusted debt. For the linear scoring scale, the Aa endpoint value is 100%. A value of 100% or better equates to a numeric score of 1.5. The Ca endpoint value is 0%. A value of 0% or worse equates to a numeric score of 20.5.

\*\* The numerator is consolidated cash flow available for debt service (CFADS), and the denominator is consolidated scheduled interest and principal payment. For the linear scoring scale, the Aa endpoint value is 20x. A value of 20x or better equates to a numeric score of 1.5. The Ca endpoint value is 0x. A value of 0x or worse equates to a numeric score of 20.5.

\*\*\* For the linear scoring scale, the Aa endpoint value is 0x. A value of 0x or better equates to a numeric score of 1.5. The Ca endpoint value is 18x. A value of 18x or worse equates to a numeric score of 20.5.

Source: Moody's Investors Service

## Notching Factors

The Predictability and Sufficiency of Cash Flows, Competitiveness / Regulatory Support, Technical and Operating Profile, and Leverage and Coverage factors represent the key ratings drivers that reflect the fundamental business, operating and financial risks for an operating project with a standard project financing structure that does not require refinancing. However, the project's financing structure and whether it faces construction and ramp-up risks are also key components of our assessment of a project's credit profile. While many project finance structures follow a similar pattern, others are more bespoke in ways that can add to or mitigate risks. Construction and ramp-up add another dimension of risk for certain issuers. Notching factors capture some of the wide-ranging variances incorporated into project financing structures and the risks associated with projects in construction.

Our assessment of these notching factors may result in upward or downward adjustments to the preliminary outcome that results from the four weighted scorecard factors. Adjustments for each notching factor may be made in half-notch or whole-notch increments, based on the notching factors descriptions below. Off-taker Risk considerations can also constrain the rating.

In aggregate, the notching factors can theoretically result in a total of up to 4 upward notches or up to 21 downward notches from the preliminary outcome to arrive at the scorecard-indicated outcome. In cases where we consider that the credit weakness or credit strength represented by a notching factor, or by these factors in aggregate, is greater than the scorecard range, we incorporate this view into the power generation project's rating, which may be different from the scorecard-indicated outcome.

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## Liquidity

### Why It Matters

Liquidity is a fundamental consideration in our project rating assessment given its importance in providing a project with the ability to withstand periodic disruptions in the receipt of revenues due to unforeseen circumstances, including operational and performance issues. We typically consider liquidity sources that are available to a project in the form of debt service reserves, major maintenance reserves, operating or similar reserves, and committed working capital facilities or other forms of supplemental, committed liquidity.

### How We Assess It for the Scorecard

#### **DEBT SERVICE RESERVE (DSR):**

The inclusion of a six-month debt service reserve is a standard project feature and results in no notching adjustment. A lower DSR would typically receive a downward adjustment of one to two notches while a higher DSR would typically receive up to a one-notch upward adjustment. Projects that exhibit higher revenue volatility may require higher DSR levels to achieve the same notching. For example, a non-diversified wind generation project may require a DSR of 12 months due to the revenue volatility attributable to wind variability risk in order to have no notching. A geothermal project, given the higher operating risk profile and the variability of the geothermal resource, may also require a DSR in excess of six months while a solar project, given the lower variability of solar resource, usually requires a six-month DSR.

We may also decide to distinguish among projects based on the type of DSR. It has become typical for a project to provide a DSR supported by a project-backed letter of credit; or, even if initially funded in cash, the DSR can be replaced with a project-level letter of credit. When structured to provide near-equivalent liquidity protection as a cash reserve, a letter-of-credit-backed DSR would typically be

treated like a cash DSR particularly if the letter of credit was not provided by the project. We typically consider the terms of the project-backed letter of credit, including whether it extends to the term of the debt or if it has to be renewed before project debt is repaid. Moreover, we normally review the letter of credit repayment terms related to a drawing thereunder and consider the impact that repayment would have on cash flow. A letter of credit that is required to be repaid immediately upon drawing provides limited liquidity protection, whereas one that can be repaid over time can, depending on the terms, be manageable for the project.

A project reserve that is either (a) truly cash funded (i.e., one that cannot be replaced with a project-level letter of credit) or (b) backed by a letter of credit that has no recourse to the project is viewed as providing stronger liquidity than other types of reserves because the potential liability would not be borne by the project; however, such an arrangement is a baseline for power projects and does not typically lead to upward notching. A project with a DSR that is greater than six months may receive an upward notching adjustment, depending on the terms of the DSR and the specifics of the project.

#### **MAJOR MAINTENANCE RESERVE (MMR):**

Depending on the severity of the project's expected maintenance profile and major maintenance cost outlays, the lack of an adequate MMR may result in a one-half to whole notch downward adjustment. Our assessment of the level of reserve needed may be informed by technical consultant reports that estimate the cost and frequency of major maintenance needed to achieve reliable operations. For a relatively new technology where the risk of outage is a significant consideration, the MMR must be sufficient and cash-funded at financial closing to avoid downward notching. In addition, certain types of technology, including coal assets, wind resources and geothermal resources, tend to require meaningful maintenance reserves to offset potential operating problems.

We may also consider how any supplemental liquidity affects the total liquidity available to the project. For example, a project could have additional operating reserves, contingent equity commitments from sponsors or committed working capital facilities in addition to a DSR and MMR. In such circumstances, we assess whether the overall level of liquidity, including supplemental liquidity, would merit notching uplift.

Including our notching for debt service and major maintenance reserves, the aggregate notching for liquidity is in the range of minus two to plus two. However, when liquidity risk is sufficiently severe, this weakness may cause the rating to be lower than the scorecard-indicated outcome.

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### **Structural Features**

#### **Why It Matters**

Because this methodology primarily applies to special purpose entities financed on a non-recourse, project finance basis with a limited business purpose, having standard structural features is considered a baseline. Structural features place important controls on the issuer and provide rights to creditors that can help decrease default risk, for instance due to step-in rights to cure defaults under project contracts, or lessen the severity of loss through collateral pledges.

For holding companies, including issuers with a minority ownership interest, key structural protections help to assure a continued stream of distributions to the holder sufficient to meet its debt service requirements. Protections may be achieved through a combination of the terms of debt (if any) at the operating company, the holding company's / minority holder's debt terms and a shareholder agreement among the owners. However, some project structural features, such as cash traps at the operating company level, may increase risk to the creditors of holding companies / minority holders.

Otherwise healthy projects can be pulled into a sponsors' bankruptcy filing. In these cases, debt service may be kept current at the project level, but solvent healthy projects may be filed for bankruptcy protection due to the ease of operation from having all entities as debtors-in-possession while in bankruptcy. A project with multiple owners, each with bankruptcy blocking rights, is less likely to be pulled into a sponsor bankruptcy than a wholly owned project.

#### How We Assess It for the Scorecard

Financing arrangements for power projects tend to be highly structured and offer protective elements to lenders, due in part to their high initial leverage levels. The baseline for an assessment of the credit profile of a project as described in the preceding sections is that the financing structure includes the standard features below. The absence of one or more standard project finance structural features or the presence of unusually strong structural features that enhance protection for creditors may result in an upward or downward adjustment up to two notches. A material weakness may cause the assigned rating to be below the scorecard-indicated outcome, even after incorporating negative notching. As noted in the "Scope of This Methodology" section, the lack of project finance structural features may also cause an issuer to be rated using a different methodology.

Some standard project finance structural features include:

- » The project company is a limited purpose entity created to engage exclusively in the specified project business and enter into the relevant contracts
- » Standard lender security package, including security on all key project contracts, tangible assets, accounts, revenues and shares in the project company
- » Trustee-administered cash flow waterfall of accounts
- » Limitations on additional indebtedness, buying and selling assets, mergers and consolidations, and investment types
- » Limitations on distributions of excess cash flows
- » Limitations on change of control or ownership, especially if sponsors are important to the project
- » Lender step-in rights and remedies to delay concession/lease termination or termination of material contracts
- » Frequent and regular reporting of compliance with contractual and financial obligations
- » Covenanted hedging policies, including for interest rates and commodity exposures, when the off-take or supply contracts do not transfer commodity risks to other parties
- » Insurance that covers all typical project risks and provides business interruption with reasonable deductibles

We also consider the extent of ring-fencing protecting the project debt in determining the level of ratings separation from the sponsor's consolidated credit profile and in assessing the impact of upstream leverage (i.e., at an intermediate holding company level) on the rating of project level debt. For this analysis, we typically consider the extent of separation provided by the actual structural features in the project's transaction documents, including those listed above.

Additionally, we typically consider other elements of independence of the project from the sponsor, including whether or not there is a requirement to have at least one independent director and his or her role(s), particularly whether his or her affirmative vote is needed to take material corporate actions, including entering into a bankruptcy filing. These considerations take on greater importance when the

credit profile of the project is otherwise materially better than the credit quality of the sponsor/parent, or if the magnitude of any intermediate-level holding company debt is significantly large such that the probability of default for upstream entities from an owner-induced voluntary bankruptcy is substantial. In circumstances where the project-level debtholder's position is weakened by the existence of a weak sponsor or upstream leverage, the project rating could be notched lower to reflect this higher risk of default if adequate ring-fencing measures are not in place.

Other considerations in assessing the level of ratings separation between the sponsor and the project include the sponsor's motivations and stated intentions, the structure of the ownership, and the underlying contractual arrangements and economics.

Contractual arrangements at the project level can also be important considerations for assessing the impact of a stressed sponsor on a project. For instance, in assessing whether a sponsor is likely to seek voluntary bankruptcy protection for the project, we may consider any contractual relationships between the sponsor and the project, whether a project bankruptcy would lead to a termination event under any project contract(s), and whether the termination event would benefit the sponsor or be harmful to the sponsor (or the sponsor's creditors).

The requirement of a termination payment in the event of a termination event may be a cause for an upward notching adjustment if the required payment (1) is sized to cover and repay all outstanding debt; and (2) will be paid by a creditworthy counterparty.

We score structural features based on their effect on the creditors at the level of the debt we are rating. For projects with rated debt at a holding company (whether wholly, partially or minority owned), we consider structural strengths and weaknesses in this notching factor from the perspective of how they may affect the project and the distributions expected to be received. Structural features may also affect our assessment of the Priority of Claim, Structural Subordination, and Double Leverage notching factor.

For projects with a minority ownership interest, we typically assess the extent to which the structural features of all relevant agreements provide the minority owner's creditors with key protections to help assure a continued stream of distributions to the minority holder sufficient to meet its debt service requirements. For example, the shareholder agreement may provide minority owners with veto rights over key decisions (such as material changes to the underlying business, distributions, incurrence of debt, filing for bankruptcy), while the terms of the debt at the holding company may prescribe the minority owner's exercise of these rights.

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## Refinancing Risk

### Why It Matters

A project that requires access to the capital markets to refinance all or a portion of the project debt outstanding at its contractual maturity date increases credit risk due to the uncertainty surrounding the availability of credit in the future and the issuer's ability to achieve manageable credit terms. Non-amortizing and partially or non-contracted structures typically have minimal contractual amortization schedules; however, cash sweep mechanisms may provide a degree of debt reduction. Nonetheless, the amount of debt that needs to be refinanced at the stated maturity debt is often meaningful.

Refinancing risk is especially pronounced for a project that is experiencing other issues, e.g., operational difficulties, contractual disputes, counterparty weakness, or changed market dynamics.

### How We Assess It for the Scorecard

We assess the expected debt load at maturity, typically based on a variety of projection scenarios, and the resultant refinancing risk based on the debt load and our expectation of cash flows available to service that debt. In our projection scenarios, we typically consider the change, if any, in the composition of cash flows (e.g., contracted, non-contracted or capacity payments), and our view of likely financing terms.

In assessing refinancing risk, we consider whether any fundamental strengths will exist at the time of refinancing to mitigate this risk, including the essentiality of the resource, the existence of an off-take contract that extends beyond the term of the debt, the remaining life of a concession, and the likely competitive position of the asset. In the absence of a material mitigant, we typically apply an adjustment of at least one-half notch downward if approximately 50% of the original debt balance is expected to be outstanding at maturity, with potentially greater notching if the percentage is higher. In aggregate, considerations around refinancing risk may result in up to a two-notch downward adjustment, but project issuer's ratings incorporate our full view of the impact of refinancing risk when it exists. Thus, pronounced or imminent refinancing risk may cause an issuer's assigned rating to be below its scorecard-indicated outcome. There is no possible upward notching under this category.

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## Construction and Ramp-up Risk

### Why It Matters

The scorecard before considering this factor is oriented to a project with steady state operations, and construction can add material, incremental risk, since the project cannot operate if it is not completed.

Construction risks for many power projects is quite moderate, because the technology is proven and has been frequently deployed for other projects and utilities, and the contractors are experienced and financially sound. However, construction risks for projects involving more complex technology, or where technology is not commercially proven, can be very high (e.g., new models of nuclear reactors).

### How We Assess It for the Scorecard

In assessing this factor, we consider the incremental risk posed by construction or ramp-up to full operations, as well as the principal mitigants for these risks. We typically assess construction complexities and the possibility for cost overruns or delays, contractual mitigants and available liquidity. Where construction risks are moderate and well-mitigated, we may not apply any notching. In cases where construction or ramp-up risks are material, we may adjust the scorecard-indicated outcome downward by as much as three notches. When we view that construction or ramp-up risk is so severe that it would not fully be captured by a three-notch downward adjustment, the assigned rating may be lower than the scorecard-indicated outcome and, in some cases, significantly lower. In cases where construction or ramp-up risk is a rating constraint, the credit profile of a project financing would typically improve when the project is completed and has achieved steady-state operations.

We employ the general guiding principles discussed in our methodology for privately financed public infrastructure projects (PFI/PPP/P3)<sup>17</sup> in the construction period to assess the magnitude of construction and ramp-up risk and the appropriate level of downward notching adjustments, if any, to the scorecard-indicated outcome before considering this factor. Some key aspects considered in the assessment of construction risk may include: an assessment of the complexity of the asset being constructed, including the construction methods, constraints and other considerations; the

<sup>17</sup> Private finance initiatives and public-private partnerships, or P3s. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

construction risk allocation; the constructor's experience, credit strength and contractual requirements; the amount of liquidity available for delays or cost overruns; and the robustness of construction period monitoring.

We typically also consider construction risks relative to other power project types, including construction and technology complexity, costs per unit of output, and the likelihood of incurring cost overruns or construction delays. We would also typically assess permitting issues, including environmental permits, land use agreements, and potential not-in-my-backyard (NIMBY) issues that could delay or complicate project construction. For example, nuclear plant construction and coal-fired generation would be considered far more complex than natural-gas-fired generation or most renewable resource projects.

We generally also assess power project contractual arrangements and the extent to which they mitigate construction risk for power plant construction relative to projects with similar technology and complexity. For projects that exhibit above-average complexity and completion risk, a fully wrapped, fixed-price, date-certain, turnkey-type arrangement can substantially transfer that risk to a third-party contractor. We also consider the level of liquidated damages (LDs) and the level of contingency in the construction budget to mitigate cost overruns and delay risks. Delay LD caps of 10%-20% of the engineering, procurement and construction (EPC) contract price and funded contingency in a range of 5%-10% of total project budget has been fairly typical. In assessing the contractor's performance obligations, we also typically consider the quantity and quality of any third-party guarantees and performance bonds that may be available to mitigate the contractor's performance shortfalls. Our assessment of the credit profile and expertise of the third-party contractor is typically a key consideration in assessing the extent to which power project construction risk is mitigated, and we may also consider the ease of replacement of the contractor. For construction projects with moderate or low construction complexity that involve an experienced contractor, we often do not apply any downward notching for construction or ramp-up considerations. Examples of this would likely be well-structured, well-mitigated construction of a natural gas plant or a proven renewable resource, such as solar photovoltaic or on-shore wind.

Our liquidity analysis during the construction period typically considers whether the project has the ability to pay cost overruns and debt service during construction until such time that the project is able to begin receiving revenue. In order to avoid a negative notching consideration for construction-related liquidity for projects with moderate construction risk, available liquidity (see description below) would generally need to be sufficient to withstand an approximate cost overrun that is 30% of the EPC contract price and a six-month delay in completion.

The liquidity available to mitigate a delay could be a combination of liquidated damages obligated to be paid by the EPC contractor, letters of credit, cash-funded debt service reserves, funded contingency amounts included in the project budget, committed cost overrun facilities and cash holdbacks.

The relative importance of the credit quality of the contractor in our assessment of construction risk generally depends on the extent of the project's reliance on any unsupported LDs from the contractor and the ease of finding a replacement contractor with similar expertise at a similar price. Liquidity risk during construction can be mitigated if the LDs are supported by standby external sources, such as letters of credit from highly rated banks.

## Priority of Claim, Structural Subordination and Double Leverage

### Why It Matters

The scorecard-indicated outcome before considering this factor is typically oriented to a senior secured debt rating of an operating project and does not consider debt positioning within a consolidated capital structure. Debt positioning can lead to downward notching in the scorecard.

For project finance debt, the terms of the financing structure typically have a high degree of influence on the relative credit risk of different debt classes, including holding company debt,<sup>18</sup> due to the payment priorities set out in the project finance waterfall. Unlike a typical (non-LBO) corporate structure, where cash flows quite freely among affiliates, such that the probability of default is very close among debt classes at all levels of the corporate family, many project finance structures contain distribution tests and cash traps that can cause probabilities of default for different debt classes to diverge. Project finance debt classes are thus typically notched,<sup>19</sup> relative to one another, based on the priority of claim in a distress scenario for the project as a whole and based on the incremental risk of default for each debt class. In the case of minority holding company debt, probability of default may be further differentiated. The project waterfall may specify the payments that are paid directly to the minority owner, such that the probability of an interruption of distributions is the same for the minority owner and the majority owner, or the minority holder may face incremental risks, for example that the majority owner might withhold distributions in order to make further investments in the project operating company.

### How We Assess It for the Scorecard

The most typical structural feature that differentiates default probability is the minimum DSCR for distributions. Since debt service at the holding company debt is typically paid solely from distributions from the project operating company, a high minimum DSCR distribution test is a strength for the project, but it materially increases the risk of default at the holding company. We would also consider how close the actual DSCR is to the minimum. If the DSCR distribution test is set at 1.25x and the project has an established, stable DSCR in the range of 2.0x, we may consider that holding company debt has relatively minor incremental default risk. If the DSCR distribution test is set at 1.25x and the actual DSCR is in the range of 1.3x-1.4x or is volatile, the downward notching of the holding company debt below the senior secured project debt would generally reflect both the higher expected default risk and the higher expected loss given default. For a holding company with a minority interest in an underlying project, we consider how the project's performance, in combination with the transaction agreements, affect probability of default and loss upon default at that level. Considerations may include the control, if any, that minority holders have over the dividend policy; major uses of cash, such as expansion, acquisitions and operating company capital expenditures; key business decisions, such as incurrence of additional debt; and key corporate decisions, including filing for bankruptcy. Limited control is likely to lead to a greater downward notching adjustment.

<sup>18</sup> Debt at a holding company on top of debt at the project operating company is also called double leverage.

<sup>19</sup> For the purposes of the notching guidance in this methodology, and on the basis of historical average loss experience across corporate ratings at various horizons, a one-notch downgrade can be thought of as generally implying an average 60% increase in expected losses for investment-grade ratings (Aaa to Baa3) and generally implying an average 40% increase in expected losses for non-investment-grade ratings (Ba1 and lower).

In addition to considering the DSCR distribution test and robustness of senior cash flows relative to those tests, ratings for junior classes would typically also consider the DSCR based on the total debt burden.<sup>20</sup> When the overall debt burden is unsustainable, ratings of senior debt may also be negatively affected. In these cases, we would also consider the strength of the intercreditor protections for senior lenders and the track record of the jurisdiction in upholding the contractual rights of senior creditors.

In assessing relative loss given default of the different debt classes, we would typically consider the amount of debt and percentage of total debt that each class represents. As a project nears default, notching among debt classes may widen, because there may be more granular information about expected recovery values and the loss implication for each debt class.

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### Off-taker Risk

A key consideration for most contracted project financings is the credit quality of the off-taker. For fully contracted projects, the off-taker may represent the sole source of revenues, and the long-term purchase contract with the off-taker is often a fundamental project strength because it insulates the project from market forces, such as changes in commodity prices or a reduction in demand for services. The level of dependence on the off-taker is related to the difficulty the project would encounter in finding a replacement contract on substantially similar terms. When such a replacement is readily available, dependence on the off-taker is low. In assessing a project's level of dependence on the off-taker, we consider the sensitivity of the project rating to off-taker(s) credit quality. There is typically a high dependence on an off-taker in cases where (i) 10% or more of the project's revenue is fully contracted under a long-term purchase contract with the off-taker and (ii) the project meets a specific need of the off-taker, and may be less valuable to other potential off-takers, such that the contract may not easily be replaced on the same terms.

In cases where the project has a high dependence on the off-taker, the credit profile of the off-taker typically acts as a cap on the project's rating. However, there may be some de-linkage when an off-taker is undergoing stress, when there is often case-specific information. For instance, we may have a better view of the likelihood that the power purchase payments would continue in a bankruptcy scenario, or the recovery implications for the project if it were to sell into the merchant market.

Please see Appendix D for more information on our assessment of off-taker credit quality when there is high dependence and our use of credit estimates.

In addition to credit quality, our assessment of off-taker risk may include considerations related to the strategic importance of the project to the off-taker and the relationship between the project and the off-taker, especially any indications of off-taker satisfaction or dissatisfaction with the project's operations or the value of the power and services that the project provides relative to equivalent market alternatives.

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<sup>20</sup> For project holding companies, including those with a minority interest, we may also consider how robust the distributions projected to be received are in relation to debt service at that level, taking into consideration the typically greater volatility of cash flows at the holding company level relative to those at the operating company. We may assess the holding company's proportionate share of the residual cash flow available after the operating company has serviced all operating company debt (and any intermediate holding company debt that is structurally senior to the holding company's debt) compared with the holding company's total debt and debt service, and we may perform scenario analysis. If cash coverage of debt or debt service at the holding company is weak, or we consider that there is some weakness in the stability of holding company cash flows, greater downward notching is likely. Stronger cash coverage and stability of holding company cash flows may support lower or, in very limited cases, even no downward notching adjustment.

## Other Considerations

Ratings may reflect consideration of additional factors that are not in the scorecard, usually because the factor's credit importance varies widely among the issuers in the sector or because the factor may be important only under certain circumstances or for a subset of issuers. Such factors include financial controls and the quality of financial reporting; corporate legal structure; the quality and experience of management; assessments of corporate governance as well as environmental and social considerations; exposure to uncertain licensing regimes; and possible government interference in some countries. Regulatory, litigation, liquidity, technology and reputational risk as well as changes to consumer and business spending patterns, competitor strategies and macroeconomic trends also affect ratings.

Following are some examples of additional considerations that may be reflected in our ratings and that may cause ratings to be different from scorecard-indicated outcomes.

### Other Counterparty Risks

A key consideration for all project financings is the extent to which a project is exposed to counterparty risk. Rapid deterioration of the financial condition of a project's key counterparty could have a significant adverse impact on the project's cash flows. A project may also have credit exposure when a material contract contains termination provisions based on a third party, for example the ability to terminate upon the actions, inactions or bankruptcy of the sponsor or its affiliates.

Insufficient contractual protection may also weaken a project's resiliency to adverse shocks. For example, a project can be significantly exposed to force majeure risks due to its limited business scope and small asset size. Where key insurance protections are limited or absent, for example a long deductible period before the project can receive business interruption payments, a project would be entirely dependent on its reserves and any sponsor support to bridge the period until it can generate cash flow. Also of importance are the force majeure provisions in the off-taker contract, including the requirements for a return to service and any deadline that may be imposed.

Other counterparty risks for a contracted project include the potential loss or termination of fuel supply, transportation or hedging contracts, an insurance policy, or construction or operating contracts.

### Structural Weakness or Complexity

Projects are contractually based. In a well-structured project, many important risks are allocated to parties able to efficiently manage them, including a construction contract, an operating and maintenance contract, a supply/fuel contract, and financing contracts. In order to be effective in allocating risks to other parties, the various contracts need to be structured to work in concert. For example, in order for lenders to have a collateral interest in an off-take agreement and step-in rights to cure a default by the project, there needs to be a consent to assignment that includes these provisions. In cases where contracts or gaps in contracts expose a project to risks that are not captured in the scorecard, the assigned rating may be lower than the scorecard-indicated outcome.

Projects exhibiting an unusual level of structural complexity and diversity of key counterparties can become exposed to increasing documentation, counterparty, contract administration and dispute risks that may cause assigned ratings to be lower than scorecard-indicated outcomes.

### Management Strategy

The quality of project and sponsor management is an important factor supporting a project's credit strength. Assessing the execution of business plans over time can be helpful in assessing management's

business strategies, policies and philosophies and in evaluating management performance relative to performance of competitors and our projections. Management's track record of adhering to stated plans, commitments and guidelines provides insight into management's likely future performance, including in stressed situations.

#### Financial Controls and Technical Advisors

We rely on the accuracy of audited financial statements to assign and monitor ratings in this sector. The quality of financial statements may be influenced by internal controls, including the proper tone at the top, centralized operations, and consistency in accounting policies and procedures. Auditors' reports on the effectiveness of internal controls, auditors' comments in financial reports and unusual restatements of financial statements or delays in regulatory filings may indicate weaknesses in internal controls.

We may also rely to a varying extent on the opinions and estimates of technical advisors, for instance an independent engineer's assessment of construction risk, a market advisor's report on the nature and depth of demand and competitive sources of supply, or a solar or wind resource advisor's estimate of energy available at a particular site. Material revisions in these advisors' opinions and estimates can cause our forward view of financial metrics to change, or they can change our overall confidence level that the project can achieve a particular level of cash flow. For instance, a geothermal consultant might call into question its own prior estimate of the quality of the steam resource based on lower production levels in the initial phase of a project before it can re-estimate the resource. The resultant uncertainty could cause the assigned project rating to be below the scorecard-indicated outcome.

#### Additional Metrics

The metrics included in the scorecards are those that are generally most important in assigning ratings to issuers in this sector; however, we may use additional metrics to inform our analysis of specific projects. These additional metrics may be important to our forward view of metrics that are in the scorecards or other rating factors. For instance, for amortizing projects we may look at forced outage rates, actual versus budgeted costs of operations and their trends, and the cost and schedule of major maintenance outages relative to budget. For non-contracted projects, we may place additional consideration on trends in revenues, costs and operating margins. We also generally consider trends affecting cash flow available to make payments to reduce debt under sweep mechanisms.

#### Event Risk

We also recognize the possibility that an unexpected event could cause a sudden and sharp decline in an issuer's fundamental creditworthiness, which may cause actual ratings to be lower than the scorecard-indicated outcome. Event risks — which are varied and can range from leveraged recapitalizations of sponsors/owners or off-takers to sudden regulatory changes to force majeure events that interrupt contracts to liabilities from an accident (e.g., a thrown turbine blade that causes severe uninsured damage and liability) — can overwhelm even a stable, well-capitalized power project. Some other types of event risks include M&A, asset sales, spin-offs, litigation, pandemics, significant cyber-crime events and shareholder distributions.

### Environmental, Social and Governance Considerations

Environmental, social and governance (ESG) considerations may affect the ratings of issuers in the power generation projects sector. For information about our approach to assessing ESG issues, please see our methodology that describes our general principles for assessing these risks.<sup>21</sup>

Power generation projects are subject to varying degrees of regulatory oversight, including environmental standards, an area of increasing scrutiny with the potential for regulatory changes, notably in the area of carbon emissions. Effects of these regulations may entail limitations on operations, higher costs, and higher potential for technology disruptions and demand substitution. Regional differences in regulation, implementation or enforcement may advantage or disadvantage particular issuers. For example, highly prescriptive policies mandating carbon reduction may have a very different impact than cap-and-trade regulation implemented over time.

Our view of future regulations plays an important role in our expectations of future financial metrics and affects the scenario analyses we may undertake as well as our confidence level in the ability of an issuer to generate sufficient cash flows relative to its debt burden over the medium and longer term. Environmental regulations are assessed under the Technical and Operating Profile factor, but when the impact is severe, it could cause this risk to have a higher-than-standard weighting in our assessment. Uncontracted or partially contracted projects are particularly exposed to risks associated with changing environmental regulations. For contracted projects, we would typically consider how the off-take contract allocates environmental risk among the project and the off-takers. In some circumstances, environmental and other regulatory considerations may also be a rating factor outside the scorecard, for instance when regulatory change is swift.

In assessing the environmental regulatory exposure of a carbon-intensive power project, for instance a coal-fired plant, we would generally consider the asset profile and potential long-term implications of such regulation on each material counterparty. Generally, older, less-efficient plants are more exposed to environmental risks, including substitution from less carbon-intensive energy sources. For example, even if a coal-fired plant is contractually insulated from the costs of capital expenditure due to environmental compliance related to changing regulations, the economic value of the project to the off-taker could decrease over time, thereby increasing credit risk for the project. For instance, the off-taker might seek to strictly enforce provisions permitting termination due to operational difficulties, whereas in a more benign economic and regulatory environment, the off-taker might have been willing to work with the project to cure the problem or to defer any enforcement. Similarly, a project in a sector that is in secular decline is less likely to receive discretionary support from the sponsor/parent.

The long-term nature of carbon transition risks as well as other environmental compliance requirements may mean that they are not fully reflected in our published scorecards. For example, we might expect that carbon regulation will have a material negative impact on cash flow generation over the long term before we can precisely project its impact, which could cause our ratings to be lower than scorecard-indicated outcomes for some power projects. Over time, carbon transition risks, as they become more precisely quantifiable, would be more likely to be captured in the scorecard.

Governance considerations are important for sponsors and may be important for projects, although strong structural features of a project financing may mitigate many governance-related risks. Among the areas of focus in governance are audit committee financial expertise, the incentives created by

<sup>21</sup> A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

executive compensation packages, related party transactions, interactions with outside auditors and ownership structure.

For issuers in this sector, we also consider social issues that could materially affect the likelihood of default and severity of loss, for example through adverse impacts on business reputation, brand strength and employee relations.

### Seasonality

Seasonality of power demand and power prices can be a concern for some uncontracted power project companies. Higher volatility creates less room for errors in product or operational execution.

### Sponsor/Parent Support

While sponsor support is considered in the scorecard, in some cases that support may have more impact on ratings than indicated in the scorecard. For example, a sponsor could make additional investments in ancillary assets, such as a stronger grid connection, to support a struggling project.

For construction projects, the timing and certainty surrounding the funding of the equity in a project is also a key part of our analysis. If equity is not injected at financial close, the rating could be negatively affected if the project does not have equity commitments that are provided by highly rated sponsors or supported by letters of credit issued by highly rated banks.

## Assigning Issuer-Level and Instrument-Level Ratings

After considering the scorecard-indicated outcome, other considerations and relevant cross-sector methodologies, we typically assign a senior secured project finance instrument rating. We may also assign ratings to other debt classes and to project finance holding companies in accordance with the "Notching Considerations" section above. For issuers that benefit from rating uplift from government ownership, we may assign a Baseline Credit Assessment.<sup>22</sup> We may also assign an issuer rating.

### Key Rating Assumptions

For information about key rating assumptions that apply to methodologies generally, please see *Rating Symbols and Definitions*.<sup>23</sup>

### Limitations

In the preceding sections, we have discussed the scorecard factors and many of the other considerations that may be important in assigning ratings. In this section, we discuss limitations that pertain to the scorecard and to the overall rating methodology.

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### Limitations of the Scorecard

There are various reasons why scorecard-indicated outcomes may not map closely to actual ratings.

<sup>22</sup> For an explanation of the Baseline Credit Assessment, please refer to *Rating Symbols and Definitions* and to our cross-sector methodology for government-related issuers. A link to a list of our sector and cross-sector methodologies and a link to *Rating Symbols and Definitions* can be found in the "Moody's Related Publications" section.

<sup>23</sup> A link to *Rating Symbols and Definitions* can be found in the "Moody's Related Publications" section.

The scorecard in this rating methodology is a relatively simple tool focused on indicators for relative credit strength. Credit loss and recovery considerations, which are typically more important as an issuer gets closer to default, may not be fully captured in the scorecard. The scorecard is also limited by its upper and lower bounds, causing scorecard-indicated outcomes to be less likely to align with ratings for issuers at the upper and lower ends of the rating scale.

The weights for each factor and sub-factor in the scorecard represent an approximation of their importance for rating decisions across the sector, but the actual importance of a particular factor may vary substantially based on an individual issuer's circumstances.

Factors that are outside the scorecard, including those discussed above in the "Other Considerations" section, may be important for ratings, and their relative importance may also vary from project company to project company. In addition, certain broad methodological considerations described in one or more cross-sector rating methodologies may be relevant to ratings in this sector.<sup>24</sup> Examples of such considerations include the following: how sovereign credit quality affects non-sovereign issuers, the assessment of credit support from other entities, the relative ranking of different classes of debt and hybrid securities, and the assignment of short-term ratings.

We may use the scorecard over various historical or forward-looking time periods. Furthermore, in our ratings we often incorporate directional views of risks and mitigants in a qualitative way.

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### General Limitations of the Methodology

This methodology document does not include an exhaustive description of all factors that we may consider in assigning ratings in this sector. Issuers in the sector may face new risks or new combinations of risks, and they may develop new strategies to mitigate risk. We seek to incorporate all material credit considerations in ratings and to take the most forward-looking perspective that visibility into these risks and mitigants permits.

Ratings reflect our expectations for an issuer's future performance; however, as the forward horizon lengthens, uncertainty increases and the utility of precise estimates, as scorecard inputs or in other considerations, typically diminishes. Our forward-looking opinions are based on assumptions that may prove, in hindsight, to have been incorrect. Reasons for this could include unanticipated changes in any of the following: the macroeconomic environment, general financial market conditions, industry competition, disruptive technology, or regulatory and legal actions. In any case, predicting the future is subject to substantial uncertainty.

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<sup>24</sup> A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

## Appendix A: Using the Scorecard to Arrive at a Scorecard-Indicated Outcome

### 1. Measurement or Estimation of Factors in the Scorecard

In the "Discussion of the Scorecard Factors" section, we explain our analytical approach for scoring each scorecard factor or sub-factor,<sup>25</sup> and we describe why they are meaningful as credit indicators.

The information used in assessing the sub-factors is generally found in or calculated from information in the project's financial statements or regulatory filings, derived from other observations or estimated by Moody's analysts. We may also incorporate non-public information.

Our ratings are forward-looking and reflect our expectations for future financial and operating performance. However, historical results are helpful in understanding patterns and trends of an issuer's performance as well as for peer comparisons. For amortizing projects, the debt service coverage ratio is typically calculated on a forward-looking basis over the remaining period of the project debt, and we consider both the average and minimum ratios. For non-amortizing projects, financial ratios, unless otherwise indicated, are typically calculated based on a forward-looking three-year average period. Our view of forward-looking ratios may be informed by historical ratios. Furthermore, the factors in the scorecard can be assessed using different time periods. For example, rating committees may find it analytically useful to examine both historical and expected future performance for different time periods.

Financial metrics may incorporate analytical adjustments that are specific to a particular power project financing.

### 2. Mapping Scorecard Factors to a Numeric Score

After estimating or calculating each weighted factor or sub-factor, each outcome is mapped to a broad Moody's rating category (Aa, A, Baa, Ba, B, Caa or Ca, also called alpha categories) and to a numeric score.

Qualitative factors are scored based on the description by broad rating category in the scorecard. The numeric value of each alpha score is based on the scale below.

Aa	A	Baa	Ba	B	Caa	Ca
3	6	9	12	15	18	20

Source: Moody's Investors Service

Quantitative factors are scored on a linear continuum. For each metric, the scorecard shows the range by alpha category. We use the scale below and linear interpolation to convert the metric, based on its placement within the scorecard range, to a numeric score, which may be a fraction. As a purely theoretical example, if there were a ratio of revenue to interest for which the Baa range was 50x to 100x, then the numeric score for an issuer with revenue/interest of 99x, relatively strong within this range, would score closer to 7.5, and an issuer with revenue/interest of 51x, relatively weak within this range, would score closer to 10.5. In the text or table footnotes, we define the endpoints of the line (i.e., the value of the metric that constitutes the lowest possible numeric score, and the value that constitutes the highest possible numeric score).

<sup>25</sup> When a factor comprises sub-factors, we score at the sub-factor level. Some factors do not have sub-factors, in which case we score at the factor level.

Aa	A	Baa	Ba	B	Caa	Ca
1.5-4.5	4.5-7.5	7.5-10.5	10.5-13.5	13.5-16.5	16.5-19.5	19.5-20.5

Source: Moody's Investors Service

### 3. Determining the Overall Scorecard-Indicated Outcome

The numeric score for each weighted sub-factor (or each factor, when the factor has no sub-factors) is multiplied by the weight for that sub-factor (or factor), with the results then summed to produce an aggregate numeric score before notching factors (the preliminary outcome). We then consider whether the preliminary outcome that results from the four weighted factors should be notched upward or downward<sup>26</sup> in order to arrive at an aggregate numeric score after notching factors (the preliminary outcome after notching) based on Liquidity, Structural Features, Refinancing Risk, Construction and Ramp-Up Risk, and Priority of Claim, Structural Subordination and Double Leverage, or constrained based on Off-taker Risk considerations. In aggregate, the notching factors can result in a total of up to 4 upward notches or up to 21 downward notches from the preliminary outcome. This preliminary outcome after notching may be adjusted downward (not upward) based on our assessment of Off-taker Risk considerations, which can act as a cap on the scorecard-indicated outcome.

The aggregate numeric score before and after notching factors and after Off-taker Risk considerations is then mapped back to an alphanumeric based on the ranges in the table below. For example, an issuer with an aggregate numeric score before notching factors of 11.7 would have a Ba2 preliminary outcome based on the ranges in the table below. If the combined notching factors totaled two upward notches, the aggregate numeric score after notching factors would be 9.7, which would map to a Baa3 preliminary outcome after notching. If there were no off-taker constraint, the scorecard-indicated outcome would also be Baa3.

<sup>26</sup> Numerically, a downward notch adds 1 to the score, and an upward notch subtracts 1 from the score.

## EXHIBIT 3

## Scorecard-Indicated Outcome

Scorecard-Indicated Outcome	Aggregate Numeric Score
Aaa	$x \leq 1.5$
Aa1	$1.5 < x \leq 2.5$
Aa2	$2.5 < x \leq 3.5$
Aa3	$3.5 < x \leq 4.5$
A1	$4.5 < x \leq 5.5$
A2	$5.5 < x \leq 6.5$
A3	$6.5 < x \leq 7.5$
Baa1	$7.5 < x \leq 8.5$
Baa2	$8.5 < x \leq 9.5$
Baa3	$9.5 < x \leq 10.5$
Ba1	$10.5 < x \leq 11.5$
Ba2	$11.5 < x \leq 12.5$
Ba3	$12.5 < x \leq 13.5$
B1	$13.5 < x \leq 14.5$
B2	$14.5 < x \leq 15.5$
B3	$15.5 < x \leq 16.5$
Caa1	$16.5 < x \leq 17.5$
Caa2	$17.5 < x \leq 18.5$
Caa3	$18.5 < x \leq 19.5$
Ca	$19.5 < x \leq 20.5$
C	$x > 20.5$

Source: Moody's Investors Service

In general, the scorecard-indicated outcome is oriented to the senior secured rating. For issuers that benefit from rating uplift from parental support, government ownership or other institutional support, we consider the underlying credit strength or Baseline Credit Assessment for comparison to the scorecard-indicated outcome. For an explanation of the Baseline Credit Assessment, please refer to *Rating Symbols and Definitions* and to our cross-sector methodology for government-related issuers.<sup>27</sup>

<sup>27</sup> A link to a list of our sector and cross-sector methodologies and a link to *Rating Symbols and Definitions* can be found in the "Moody's Related Publications" section.

## Appendix B: Power Generation Projects Scorecard — Fully Amortizing and Contracted Project Structures

	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
<b>Factor: Predictability and Sufficiency of Cash Flows (30%)</b>								
Quality and Diversity of Cash Flow Stream	25%	Highly predictable, fully contracted cash flow from off-taker(s) with credit quality of at least Aa3-equivalent, and contracts extend beyond the term of the financing. AND Contracts are structured to directly pass through all commodity costs, operating and maintenance (O&M) costs, environmental costs and capex without material conditions. Contracts are take-or-pay. No fuel supply/resource risk.	Highly predictable, fully contracted cash flow from one or more off-takers with credit quality of at least A3-equivalent, and contracts extend for the full term of the financing. AND Contracts are structured to pass-through all commodity costs and O&M costs and include pass through of material environmental costs, including capex, due to change in regulation. Contracts are take-or-pay. No fuel supply/resource risk. OR Highly predictable, fully contracted cash flow for the full term of the financing with off-taker(s) of at least Baa3-equivalent credit quality for which the project is essential to its power supply resource (or project can easily be re-contracted on equivalent terms). AND Five or more years of strong operating and financial performance.	Highly predictable fully contracted cash flow from one or more off-takers with credit quality of at least Baa3-equivalent, and contracts extend for the full term of the financing. Contracts typically have price escalators tied to inflation. Low fuel-supply/resource risk. OR Highly predictable, fully contracted cash flow for the full term of the financing with off-taker(s) of Ba-equivalent credit quality for which the project is essential to its power supply resources (or project can easily be re-contracted on equivalent terms). AND Five or more years of strong operating and financial performance.	At least 50% of expected cash flow stream is based on contracted or hedged cash flow over the medium term (3-5 years) but may not extend for the full financing term. Unhedged cash flow is expected to exhibit relatively low year-to-year volatility. Greater degree of unhedged cash flow can be tolerated if such cash flows are derived from well-established capacity markets. Some fuel-supply/resource risk. OR Highly predictable, fully contracted cash flow for the full term of the financing with off-taker(s) of B1-equivalent credit quality for which the project is essential to its power supply resources (or project can easily be re-contracted on equivalent terms). AND Five or more years of strong operating and financial performance.	Less than 50% of expected cash flow is based on contracted or hedged cash flow over the medium-or-short-term. Unhedged cash flow is vulnerable to year-over-year volatility. High fuel-supply/resource risk. OR Cash flows, irrespective of contractual arrangements, are marginally sufficient to meet debt obligations.	Cash flows, irrespective of contractual arrangements, likely to be insufficient to meet debt obligations.	Cash flows, irrespective of contractual arrangements, are substantially insufficient to meet debt obligations.

	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
<b>Factor: Predictability and Sufficiency of Cash Flows (30%)</b>								
Conditions for Contract Payments or Receipt of Revenues	5%	No conditions exist that would cause revenues not to be paid.	Revenue levels are highly probable under virtually all scenarios.	Conditions for payments are probable under most scenarios. Debt service payments are largely based on receipt of capacity payments or reservation charges based on the operating performance of the plant and the terms of the contract.	Conditions for payment can be less predictable due to the terms of the contract based on the operating history or expected performance of the plant.	Conditions for payment are less certain. Receipt of revenues may have greater volatility due to technological risks or operational risks, or may depend on factors beyond the control of the project.	Receipt of revenues is highly uncertain. Receipt of revenues may experience material volatility due to technological or operational challenges, or may highly depend on factors beyond the control of the project.	Receipt of revenues is unlikely.

	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
<b>Factor: Competitiveness / Regulatory Support (15%)</b>								
Competitiveness of Contracts Relative to Market / Regulatory Support	15%	Terms of the contracts (for both conventional and renewable projects) will always be very competitive to prevailing market prices. No impact on expected revenue stream following termination of contract(s). AND Negligible exposure to meaningful environmental risks.	Terms of the contracts (for both conventional and renewable projects) will always be competitive to prevailing market prices during term of financing. Little, if any, impact is expected on revenue stream following termination of contract(s). AND Modest exposure to environmental risks that are not expected to be material to credit quality.	Terms of the contracts are expected to be at or near market prices during the term of the financing. Some revenue impact could occur if contract(s) is terminated, but revenue erosion is expected to be relatively modest. Emerging exposure to environmental risks may have credit implications over the medium term (3-5 years) but there is meaningful uncertainty whether financial implications will be material. For renewable projects, strong regulatory support from central government, regional jurisdiction or rate-setting authority. There is little risk of a change in law or of supportive regulation eroding over time. There is good history of contract sanctity or a legal protection against subsidy reduction. The price for renewable energy is at or near prices for other renewable energy in the same jurisdiction.	Terms of the contracts are moderately above market prices for the foreseeable future. Loss of contract(s) would have a temporary impact on revenues, but project should be able to secure replacement revenues in a reasonably short time frame. Emerging exposure to environmental risks could be material to credit quality over the medium term (3-5 years) but less likely over the near term. For renewable projects, generally supportive regulatory framework for renewable generation from central government, regional jurisdiction or rate-setting authority, but support could erode over time due to a change in law or supportive regulation. The price for renewable energy is slightly above prices for other renewable energy in the same jurisdiction.	Terms of the contracts are significantly above market prices for the foreseeable future. Termination of contract(s) would likely result in severe cash flow erosion, and replacement contract(s), if secured, would likely be on substantially less favorable terms. Termination of contract(s) would make timely payments of operating costs and debt service difficult. Failure to obtain replacement contract(s) could result in a payment default in a two-year time frame. OR Immediate, elevated exposure to environmental risks that have material financial implications. For renewable projects, regulatory framework is less supportive. Or, if currently supportive, this regulatory support has been challenged or is vulnerable to change that could have a negative impact on the economics of the project. Price competitiveness of the project relative to other renewable energy sources is weak.	Terms of the contracts are substantially above market prices for the foreseeable future. Termination of contract(s) would result in an immediate loss of cash flow, with the prospect of securing any replacement extraordinarily difficult; or termination of contract(s) would likely result in a payment default within a one-year time frame. OR Elevated credit exposure to environmental risks challenges financial viability. For renewable projects, regulatory environment is unstable or part of an emerging market with little history or transparency with respect to contract sanctity or legal protections.	Terms of the contracts are being actively challenged. High risk of abrogation of a contract affecting material project cash flows.

	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
<b>Factor: Technical and Operating Profile (20%)</b>								
Technology and Operating Performance	10%	Simple, commercially proven technology/process with minimal moving components. AND Revenues and cash flow are not impacted by operational performance. OR Long-term O&M contract with highly creditworthy and experienced operator; and O&M contract extends to debt maturity and fully insulates project from operating issues.	Simple, commercially proven technology/process with few moving components or well diversified portfolio of operating plants. LTSA or warranties/performance guarantees from creditworthy OEM are in place for the term of the financing. AND Operating history at plant and at projects using similar technology has been well above industry averages; O&M contract with a creditworthy and experienced operator; and O&M contract extends to debt maturity and includes significant protection against operating problems.	Commercially proven technology/process that is well understood and considered standard for the industry. LTSA or warranties/performance guarantees from creditworthy OEM are in place for a number of years of the project's life. AND Reliable operating history at plant and at projects using similar technology. Long-term O&M contract with a creditworthy, recognized operator. O&M contract provides material incentive for strong operating performance, including liquidated damages.	Commercially proven technology/process with several complex elements requiring specialized skills to operate and maintain. OR Has experienced periodic operating challenges that may reoccur. O&M contract with recognized operator provides some incentive for strong operating performance.	Most of technology is considered to be proven, but certain elements are untested or have limited operating history. OR Commercially proven technology/process that has experienced significant operating challenges that are likely to persist. O&M contract with less experienced operator. O&M contract does not include material incentive for strong operating performance.	Technology is unproven and untested with very limited operating track record, or technology has high obsolescence risk. OR Commercially proven technology/process that has experienced material operating challenges that are highly likely to continue. OR O&M contractor has limited experience or has operated the plant below expectations for a meaningful period. O&M contract provides little benefit to the plant.	Technology is unproven and untested with no operating track record or unlikely to perform as expected. OR Commercially proven technology/process that has experienced irreversible operating challenges. OR O&M contractor has no material experience or has operated the plant substantially below expectations for an extended period. O&M contract provides no benefit to the plant.
Sponsor Commitment	10%	Financial support from a strategic sponsor with a very strong credit profile is certain should operating or financial problems occur.	Financial support from a strategic sponsor with a strong credit profile is highly likely should operating or financial problems occur.	Sponsor is a strategic or financial investor with a moderately strong credit profile and meaningful economic incentive and financial resources to support its investment.	Sponsor is typically a financial investor with a moderately strong credit profile and adequate economic incentive and financial resources to support its investment.	Sponsor has limited economic incentive or financial resources to support its investment.	Sponsor has little to no economic incentive or financial resources to support its investment.	Sponsor has no economic incentive or financial resources to support its investment.

	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
Factor: Leverage and Coverage (35%)								
Debt Service Coverage Ratio <sup>*1</sup>	35%	≥ 3.5x	1.9x - 3.5x	1.4x - 1.9x	1.2 - 1.4x	1.1 - 1.2x	1.0 - 1.1x	< 1.0x

Liquidity	(notching factor)
Structural Features	(notching factor)
Refinancing Risk	(notching factor)
Construction and Ramp-up Risk	(notching factor)
Priority of Claim, Structural Subordination and Double Leverage	(notching factor)
Off-taker Risk	Potential Constraint

<sup>\*1</sup> The numerator is consolidated cash flow available for debt service (CFADS), and the denominator is consolidated scheduled interest and principal payment. For the linear scoring scale, the Aa endpoint value is 10x. A value of 10x or better equates to a numeric score of 1.5. The Ca endpoint value is 0x. A value of 0x or worse equates to a numeric score of 20.5.

Source: Moody's Investors Service

## Appendix C: Power Generation Projects Scorecard — Non-amortizing and Partially Contracted or Non-contracted Project Structures

	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
<b>Factor: Predictability and Sufficiency of Cash Flows (20%)</b>								
Quality and Diversity of Cash Flow Stream	20%	Highly predictable, fully contracted cash flow from off-taker(s) with credit quality of at least Aa3-equivalent, and contracts extend beyond the term of the financing. AND Contracts are structured to directly pass through all commodity costs, operating and maintenance (O&M) costs, environmental costs and capex without material conditions. Contracts are take-or-pay. No fuel supply/resource risk.	Highly predictable, fully contracted cash flow from one or more off-takers with credit quality of at least A3-equivalent, and contracts extend for the full term of the financing. AND Contracts are structured to pass through all commodity costs, O&M costs and include pass-through of material environmental costs, including capex, due to change in regulation. Contracts are take-or-pay. No fuel supply/resource risk. OR Highly predictable, fully contracted cash flow for the full term of the financing with off-taker(s) of at least Baa3-equivalent credit quality for which the project is essential to its power supply resource (or project can easily be re-contracted on equivalent terms). AND Five or more years of strong operating and financial performance.	Highly predictable fully contracted cash flow from one or more off-takers with credit quality of at least Baa3-equivalent, and contracts extend for the full term of the financing. Contracts typically have price escalators tied to inflation. Low fuel-supply/resource risk. OR Highly predictable fully contracted cash flow for the full term of the financing with off-taker(s) of Ba-equivalent credit quality for which the project is essential to its power supply resources (or project can easily be re-contracted on equivalent terms). AND Five or more years of strong operating and financial performance.	At least 50% of expected cash flow stream is based on contracted or hedged cash flow over the medium-term (3-5 years) but may not extend for the full financing term. Hedged cash flow is expected to exhibit relatively low year-to-year volatility. Greater degree of unhedged cash flow can be tolerated if such cash flows are derived from well-established capacity markets. Some fuel-supply/resource risk. OR Highly predictable fully contracted cash flow for the full term of the financing with off-takers of B1-equivalent credit quality for which the project is essential to its power supply resources (or project can easily be re-contracted on equivalent terms). AND Five or more years of strong operating and financial performance.	Less than 50% of expected cash flow is based on contracted or hedged cash flow over the medium or short term. Unhedged cash flow is vulnerable to year-over-year volatility. High fuel-supply/resource risk. OR Cash flows, irrespective of contractual arrangements, are marginally sufficient to meet debt obligations.	Cash flows, irrespective of contractual arrangements, likely to be insufficient to meet debt obligations.	Cash flows, irrespective of contractual arrangements, are substantially insufficient to meet debt obligations.

	Sub-factor Weight	Aa	A	Baa	Ba	B	Caa	Ca
<b>Factor: Competitiveness / Regulatory Support (15%)</b>								
Competitiveness of Project Assets / Regulatory Support	15%	Highly competitive portfolio of geographically diverse assets. AND Expected to remain the lowest all-in cost structure in the respective regions. AND Very high obstacles to entry will persist. AND Negligible exposure to meaningful environmental risks.	Very competitive portfolio of geographically diverse assets. AND Among the lowest all-in cost structure of assets in the respective regions. AND High obstacles to entry will persist. AND Very modest exposure to environmental risks that are not expected to be material to credit quality.	Geographically diverse portfolio of assets that are competitive on balance, or a very competitive single asset. Asset(s) generally among the lowest all-in cost structure in the region. Currently, obstacles to entry exist. Operates where significant regional supply constraints exist, or may have regulatory or legislative protection for extended period of time. Modest exposure to environmental risks with potential credit implications over the medium term (3-5 years) but there is uncertainty whether financial implications will be material.	Generally competitive asset(s). Asset(s) currently among the lower all-in cost structures in the region, but competitive position could be challenged by new entrants or by changes in laws/regulations. Obstacles to entry exist, but could decline over time. Operates in a region where some generating supply constraint exists, or has some current regulatory or legislative protection in its marketplace for an intermediate-term time frame. Emerging exposure to environmental risks that could be material to credit quality over the medium term (3-5 years) but less likely over the near term.	Competitive position is weak. Ability to operate is highly dependent on certain legislative or regulatory protections in place, which could erode over time. OR Obstacles to entry exist, but are fairly weak. New entrant could make asset class vulnerable to being shut down or displaced. Asset(s) operates in region that has a degree of excess generating supply for the next several years. OR Elevated exposure to environmental risks that have material financial implications.	Very weak competitive position. Operates in a region that has excessive generating supply. OR Asset(s) highly vulnerable to being permanently shut down. OR Immediate elevated credit exposure to environmental risks challenges financial viability.	Restructuring likely needed to improve weak competitive position.

	Sub-factor weight	Aa	A	Baa	Ba	B	Caa	Ca
<b>Factor: Technical and Operating Profile (20%)</b>								
Technology and Operating Performance	10%	Simple, commercially proven technology/process with minimal moving components. AND Revenues and cash flow are not impacted by operational performance. OR Long-term O&M contract with highly creditworthy and experienced operator; and O&M contract extends to debt maturity and fully insulates project from operating issues.	Simple, commercially proven technology/process with few moving components or well diversified portfolio of operating plants. LTSA or warranties/performance guarantees from creditworthy OEM are in place for the term of the financing. AND Operating history at plant and at projects using similar technology has been well above industry averages; O&M contract with a creditworthy and experienced operator; and O&M contract extends to debt maturity and includes significant protection against operating problems.	Commercially proven technology/process that is well understood and considered standard for the industry. LTSA or warranties/performance guarantees from creditworthy OEM are in place for a number of years of the project's life. AND Reliable operating history at plant and at projects using similar technology. Long-term O&M contract with a creditworthy, recognized operator. O&M contract provides material incentive for strong operating performance, including liquidated damages.	Commercially proven technology/process with several complex elements requiring specialized skills to operate and maintain. OR Has experienced periodic operating challenges that may reoccur. O&M contract with recognized operator provides some incentive for strong operating performance.	Most of technology is considered to be proven, but certain elements are untested or have limited operating history. OR Commercially proven technology/process that has experienced significant operating challenges that are likely to persist. O&M contract with less experienced operator. O&M contract does not include material incentive for strong operating performance.	Technology is unproven and untested with very limited operating track record, or technology has high obsolescence risk. OR Commercially proven technology/process that has experienced material operating challenges that are highly likely to continue. OR O&M contractor has limited experience or has operated the plant below expectations for a meaningful period. O&M contract provides little benefit to the plant.	Technology is unproven and untested with no operating track record or unlikely to perform as expected. OR Commercially proven technology/process that has experienced irreversible operating challenges. OR O&M contractor has no material experience or has operated the plant substantially below expectations for an extended period. O&M contract provides no benefit to the plant.
Sponsor Commitment	10%	Financial support from a strategic sponsor with a very strong credit profile is certain should operating or financial problems occur.	Financial support from a strategic sponsor with a strong credit profile is highly likely should operating or financial problems occur.	Sponsor is a strategic or financial investor with a moderately strong credit profile and meaningful economic incentive and financial resources to support its investment.	Sponsor is typically a financial investor with a moderately strong credit profile and adequate economic incentive and financial resources to support its investment.	Sponsor has limited economic incentive or financial resources to support its investment.	Sponsor has little to no economic incentive or financial resources to support its investment.	Sponsor has no economic incentive or financial resources to support its investment.

	Sub-factor weight	Aa	A	Baa	Ba	B	Caa	Ca
<b>Factor: Leverage and Coverage (45%)</b>								
Project Cash from Operations / Adjusted Debt <sup>*1</sup>	15%	≥ 80%	46% - 80%	25% - 46%	10% - 25%	4% - 10%	2% - 4%	< 2%
Debt Service Coverage Ratio <sup>*2</sup>	15%	≥ 14x	8x - 14x	4x - 8x	2x-4x	1x - 2x	0.5x - 1x	< 0.5x
Debt / EBITDA <sup>*3</sup>	15%	≤ 1.5x	1.5x - 2.5x	2.5x - 3.5x	3.5x - 6.0x	6.0x - 9x	9x - 13x	> 13x

Liquidity	(notching factor)
Structural Features	(notching factor)
Refinancing Risk	(notching factor)
Construction and Ramp-up Risk	(notching factor)
Priority of Claim, Structural Subordination and Double Leverage	(notching factor)
Off-taker Risk	Potential Constraint

\*1 The numerator is cash flow from operations (after taxes and interest expense) less major maintenance capex plus or minus scheduled transfers from/to major maintenance reserves, and the denominator is total adjusted debt. For the linear scoring scale, the Aa endpoint value is 100%. A value of 100% or better equates to a numeric score of 1.5. The Ca endpoint value is 0%. A value of 0% or worse equates to a numeric score of 20.5.

\*2 The numerator is consolidated cash flow available for debt service (CFADS), and the denominator is consolidated scheduled interest and principal payment. For the linear scoring scale, the Aa endpoint value is 20x. A value of 20x or better equates to a numeric score of 1.5. The Ca endpoint value is 0x. A value of 0x or worse equates to a numeric score of 20.5.

\*3 For the linear scoring scale, the Aa endpoint value is 0x. A value of 0x or better equates to a numeric score of 1.5. The Ca endpoint value is 18x. A value of 18x or worse equates to a numeric score of 20.5.

Source: Moody's Investors Service

## Appendix D: Assessing Off-taker Credit Quality and the Use of Credit Estimates for Power Generation Projects

Off-taker credit quality is a consideration in two sections of the methodology:

- » Scoring for the Quality and Diversity of Cash Flow Stream sub-factor, and
- » Off-taker Risk – in cases of high dependence on the credit quality of the off-taker, the off-taker's credit profile typically acts as a cap on the project's rating.

The level of dependence on an off-taker is related to the difficulty the project would encounter in finding a replacement contract on substantially similar terms. In assessing a project's level of dependence on the off-taker, we consider the sensitivity of the project rating to off-taker(s) credit quality. There is typically a high dependence on an off-taker in cases where (i) 10% or more of the project's revenue is fully contracted under a long-term purchase contract with the off-taker and (ii) the project meets a specific need of the off-taker, and may be less valuable to other potential off-takers, such that the contract may not easily be replaced on the same terms.

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### Approach for Assessing the Credit Quality of High Dependence Off-takers

Where a project has high dependence on the off-takers(s), the off-taker's credit quality is assessed using one of the following:

- (1) a monitored public or private rating<sup>28</sup> of the off-taker (the reference is typically an issuer rating or a senior unsecured rating); or
- (2) a monitored public or private rating<sup>29</sup> of an affiliate of the off-taker and, after considering the off-taker's legal position and the importance of its activities to the corporate family (or where the off-taker is a government enterprise, its importance to the government), a rating committee views the credit quality of the off-taker as being at or near that of the rated affiliate or government.

Where there are multiple off-takers<sup>30</sup> we typically consider the weighted average credit profile of the off-takers.

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### Alternative Approach for Low Dependence Off-takers

Where a project has low dependence on the off-taker(s), we may use credit estimates to assess off-taker credit quality.<sup>31</sup> The aggregate use of credit estimates for low dependence off-takers would be limited by a market-based replacement test, described below.

In cases where sufficient information is not available to assess an off-taker's credit quality or the related cash flows are very small, we may consider the expected project cash flows from off-take agreements excluding that entity, and we may exclude these cash flows in our calculation of financial metrics, or, where market-based sales are a viable option, we may consider a scenario where the excluded off-taker's contracted sales are replaced by merchant sales. In these cases, we typically base our assessment of off-taker credit quality on the weighted average credit profile of the remaining off-takers.

<sup>28</sup> Ratings are assigned using the relevant sector methodologies.

<sup>29</sup> Ratings are assigned using the relevant sector methodologies.

<sup>30</sup> Where off-taker obligations are joint and several, we typically consider the highest-rated off-taker and its maximum potential contractual share in calculating the weighted average credit quality.

<sup>31</sup> Please see our cross-sector methodology that discusses credit estimates. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

### Determination of Aggregate Use of Credit Estimates for Low Dependence Off-takers

To determine the aggregate use of credit estimates in assessing the credit profile of a project's off-taker(s), we apply a market-based replacement test to assess the impact on the project's cash flows and credit profile of losing all the contracts of low dependence off-takers and replacing them with off-take contracts, forward sales agreements, or spot sales at prevailing market rates.<sup>32</sup>

- » If the credit profile of the project under this scenario (as indicated by the scorecard-indicated outcome) is at least equivalent to that prior to the test, then the dependence of the project on those off-takers is considered **low** and a credit estimate may be used to assess the credit quality for each of those off-takers.
- » If the market replacement test results in a scorecard-indicated outcome that is lower than that of the project prior to the test, then the dependence of the project on those off-takers is considered **high** and we do not use credit estimates. Instead, we use one of the two assessment methods enumerated in "Approach for Assessing the Credit Quality of High Dependence Off-takers" above to determine the credit profile of each of the off-takers.
- » As an alternative, we may disregard in our analysis the contracts associated with the off-takers where credit estimates would otherwise be used, and we would use the contracted cash flows and weighted average credit quality of the remaining off-takers.

Where credit estimates are used to assess weighted average credit quality for purposes of scoring the Quality and Diversity of Cash Flow Stream sub-factor or for the Off-taker Risk notching factor, we would apply a two-notch haircut to each credit estimate. We would not apply a jump-to-default test. (Please see our cross-sector methodology for the use of credit estimates,<sup>33</sup> which describes the jump-to-default test.)

We may use credit estimates as supplementary information in our analysis.

<sup>32</sup> When information about the availability or pricing of replacement off-take contracts is not available, we would use forward sales agreement prices, and when that information is not available, we would consider prevailing spot prices. Based on market conditions and the specific operating profile of the project, there may not be a market for the project's output, in which case the market-based replacement value would be zero.

<sup>33</sup> A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

## Moody's Related Publications

Credit ratings are primarily determined through the application of sector credit rating methodologies. Certain broad methodological considerations (described in one or more cross-sector rating methodologies) may also be relevant to the determination of credit ratings of issuers and instruments. A list of sector and cross-sector credit rating methodologies can be found [here](#).

For data summarizing the historical robustness and predictive power of credit ratings, please click [here](#).

For further information, please refer to *Rating Symbols and Definitions*, which is available [here](#).

OUTDATED  
METHODOLOGY

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