Article Title: Criteria | Infrastructure | General: Sector-Specific Project Finance Rating Methodology Data: OVERVIEW AND SCOPE This article presents the credit factors and typical assumptions S&P; Global Ratings uses in its analysis of specific project finance sectors. In particular, we consider the credit factors and assumptions detailed in tables 1-35 when determining projects' operations and construction phase stand-alone credit profiles (SACPs). The sectors we see as most common in project financings are: Power, Social infrastructure, Transportation infrastructure, and Commodities and natural resources. This article complements and should be read in conjunction with "General Project Finance Rating Methodology" and "Sector And Industry Variables: Project Finance Rating Methodology." Key Publication Information Effective date: The criteria are effective Dec. 14, 2022, except in jurisdictions that require local registration. In those jurisdictions, the criteria will be effective only after the local registration process is completed. This updated methodology follows our request for comment, titled "Request For Comment: Project Finance Rating Methodology," published Aug. 9, 2022. For the changes between the RFC and the final criteria, see "RFC Process Summary: Project Finance Rating Methodology," Dec. 14, 2022. These criteria supersede the criteria articles listed in the "Fully superseded criteria" section at the end of this article. Contents METHODOLOGY The power projects sector covers electricity generation and transmission power project financings and related segments, including battery and energy storage, residential solar, and hydrogen-based project financings. Power project financings generate revenue from the production, sale, and/or transport of power. These revenues can stem from merchant sales, which are exposed to both pricing and volume risk, and from contractual obligations, which can be tolling based, power purchase (volume and price) based, or hedged through financial commitments. ESG considerations.Among ESG factors that can affect the construction or operations of power assets, environmental and governance aspects may be heightened owing to the usage of fossil fuels. On the other hand, nuclear production will likely receive strong social opposition in neighborhoods where units are located on account of the high impact (though low probability) of a radiation leak. Operations Phase SACP--Business Assessment Performance risk Asset class operational stability (ACOS).Depending on the technology involved, the ACOS for power projects range from 1, which represents simple processes that are easy to operate with predictable stability, to 6, when technology involves complex processes that present significant operational challenges (see chart 1). In rare cases, assessments of 7 to 9 are possible, indicating much higher sophistication and the potential for lengthy outages. Chart 1 Project-specific attributes.Table 1 summarizes the typical project-specific analytical considerations that may modify the ACOS for power projects. Table 1 Project-Specific Attributes For Power Asset Types PROJECT-SPECIFIC ATTRIBUTE EXAMPLES OF FAVORABLE ADJUSTMENTS EXAMPLES OF UNFAVORABLE ADJUSTMENTS Performance redundancy A portfolio comprising wind projects across several wind regimes, or a portfolio with at least three to four assets of different fuel types, or configurations (e.g., six 1x1 gas fired machines), or excess units relative to project terms (We typically, analyze geographical, fuel types or configuration redundancies.) Operating leverage Some forms of newer gas technologies that have exhibited meaningfully lower operations and maintenance (O&M;) costs Projects that have disproportionately high property taxes relative to peers Technological performance A stand-alone battery technology or hydrogen project that does not have an adequate track record, or new evolutions of gas-fired technology that do not have adequate fleet-leader fired hours Performance standards Minimum volume commitments that are relatively easy to achieve in renewable contracts Conversion efficiency (heat rate) degradation below levels specified in tolling contracts, heat rate call options, financially settled contracts Resource risk.Resource availability is a key consideration for most power generation projects (see table 2). However, they can secure access to resource and raw material feedstocks in different ways. Many power projects tap directly into resources, such as run-of-river hydro, wind, solar, and geothermal. Others, such as combined cycle gas turbine plant, typically contract for feedstocks with third parties. In these cases, our analysis focuses on contract terms, counterparty creditworthiness, and counterparties' ability to deliver the feedstock. Contractual arrangements typically have two components: one contract for the supply of a feedstock and another contract for the transportation and delivery of a feedstock. Quality requirements are a major consideration of the contracts, and supply contracts vary from a few months to a power project's entire asset life. We assess contractual arrangements under resource risk, but we assess fuel supply price risk under market risk. Table 2

Resource Risk For Power Asset Types ASSESSMENT EXAMPLES Low or N/A Transmission projects generally have a low risk assessment. A contractual coal supplier could expose a power project to lower volumes during the winter owing to weather force majeure events. But, a stockpile of several months of supply at the power project could mitigate this risk. We assess a natural gas-fired power plant that lacks a supply contract for fuel as low only if it is located in a mature natural gas market that has proven reserves well in excess of the power project's needs, with direct access to multiple natural gas pipelines. Medium Examples include a solar resource where we're highly confident in the resource estimation, based on reliable analysis from multiyear data at the site that supports a long-term view of expected resource availability, and a geothermal project with solid and reliable data on the geothermal resource's actual performance. These projects have medium risk if our analysis indicates that the proven resource life will comfortably supply the power project's expected needs. High We typically make an upward adjustment for a run-of-river hydro project (unless on-site extended data suggested otherwise) because production could vary by 25% (up or down) from a baseline amount over the long term. Very high This assessment is generally the result of unforeseen setbacks to resource supply and is not typical for a new transaction since sponsors usually consider mitigation when the transaction is initiated. N/A--Not applicable. Sometimes a power project consists of several individual assets of generally similar size and each asset relies on a separate natural resource regime to generate cash flow. An example is a wind project comprising multiple assets in different locations, each contributing materially to aggregate cash flows, and relying on a wind regime that is independent from (that is, has a low correlation with) the wind regime supplying the other projects. In this case, we expect the overall project's production to be less variable than the production from any single asset in the portfolio. The project's resource assessment would be one better than the lowest assessment among the individual projects in the portfolio because diversity across regions can partly mitigate resource risk. We may adjust down the resource assessment defined in table 2 by at least one if we consider the projected cash flow highly dependent on resources available during very short periods of the year, unless compensated by liquidity reserves. Market risk Depending on the market or type of contracts, power projects could face volatile sales prices and volumes. Market risks generally include the power project's: Ability to sell and deliver all its production (or a minimum volume under contractual terms) to offtakers or into the market, The electricity price it earns for its production, The cost it pays for raw materials that influence its cost structure, and The penalty for underdelivering on a contract requirement. Market exposure.Market exposure derives from the nature of the project contract or exposure to unregulated markets (see table 3). Table 3 Market Exposure Assessment: Power Projects PROJECTED DECLINE IN CFADS FROM THE BASE CASE TO THE MARKET EXPOSURE CASE (%) ASSESSMENT EXAMPLES <5 N/A Tolling projects--typical solar, wind, or battery projects and fully contracted projects; projects with power purchase agreements (PPAs) with fixed price but are volume exposed, if volume variability is below 5% 5-15 Low Projects with predominately contracted revenue but a modest level of price or volume exposure 15-30 Medium Projects with capacity payments and hedged revenues but exposure to merchant tails 30-50 High Merchant power plants with hedges covering only a portion of expected sales >50 Very high Projects with full exposure to volatile power prices, in volatile markets Note: Base case and market exposure case are defined in section 4 of the criteria. CFADS--Cash flow available for debt service. Competitive position.For unregulated power generation, competitive advantage is key to the business assessment. Competitive advantages, or disadvantages, can manifest in different ways. Examples where competitive position becomes relevant include: A project that faces political opposition, A mine-mouth plant with access to cheaper fuel, A plant site that is poorly located for transmission connections, and An asset that is contractually responsible for climate transition risk versus a competitor that may not face these risks. An asset's cost structure is among the main factors in this assessment because a price-taking asset (meaning its actions don't affect prices in the market) is subject to market volatility. Having the ability to dispatch under most price conditions is a significant strength. For power projects with availability-based revenue or fully contracted power projects, the competitive position assessment is typically neutral. However, we may assess it differently if we expect the competitive factors detailed in table 4 may hurt the creditworthiness of the project. Table 4 Competitive Position Assessment: Power Projects COMPETITIVE FACTOR MAIN CHARACTERISTICS ANALYZED EXAMPLE IMPACT Basis and fuel compensation Could fuel costs expose a power project to revenue and cost mismatch under an offtake contract? When an offtaker pays a project for production based on the price of fuel at one location, but the project is only able to obtain the fuel at a different location where the price is much higher Negative Curtailment Is there an economic constraint (not enough demand) or transmission access constraint? Project dispatch curtailed because of oversupply without compensation; transmission line used to deliver the electricity is at full capacity and, as a result, the project is not able to deliver its production Negative Geographic location Does the project have an incumbent position? Project with access to inexpensive, trapped fuel, or permits to access markets not available to peers Positive Sustained cost competitiveness Does the project have a secular decline in its cost curve, or does it have zero emissions benefits? A base-loaded geothermal unit generating firm renewable power Positive Operations Phase SACP--Financial Assessment Base case The base case factors in contractual arrangements (including tolls, power purchase agreements, and heat rate call options) that mitigate market exposure for the contractual duration. For contracts shorter than the project or debt tenor, we assume these contracts expire and the project then faces prevailing market rates. We assume so unless the project has the unilateral right to (and we conclude it will) extend the contract, which is price and volume certain. Table 5 Base-Case Assumptions: Power Projects ITEM BASE CASE OPERATIONAL FACTORS Performance (such as availability, conversion efficiency) Initially, we consider the performance that is typical for the asset class in the relevant market and then adjust for particular project attributes, the performance of the power project's peers in the market, our experience, and, where available, independent experts' opinions. Over time, the base case also takes into account actual operating results. Variable operations and maintenance cost Same as above Routine operations and maintenance cost Same as above Major maintenance schedule and cost Same as above Fuel supply risk We typically develop our assumptions based on the information available on the fuel supply conditions and the curtailment history for the site, as well as our experience with other power projects in the region. Natural resource and raw material availability Our initial assessment usually considers the expected average availability of the resource or raw material at the power project's site when sufficient onsite data is available. We adjust for probable long-term regional trends in resource variation, such as those that may occur due to the region's known long-term weather cycles. MARKET FACTORS Key commodity and raw materials costs and basis differentials We typically use current prices for the first year and forward prices for the next two to five years and then adjust prices to what we would consider midcycle prices. For fuel or power basis differentials between two hubs and nodes, we consider the information available about the differentials and adjust for market developments that could lead to lower or higher pricing between two locations than previously observed. An example of a development that could affect a basis differential is a new pipeline being built in a constrained area. Power prices The base-case assumptions of power prices incorporate other market factors, such as transmission constraints, ability to source different fuel, and locational advantages relative to contiguous generation units. Capacity prices and emissions-related taxes Some markets include capacity constructs or taxes (such as carbon tax), with prices established by a central body or determined periodically through a process. If the prices are difficult to predict, we form a view of future prices based on historical prices, high supply and demand that might affect outcomes, and some understanding of the prices needed to attract new investment or to achieve a policy goal. Transmission curtailment Our assumptions are based on the curtailment history for the site and adjust to reflect any changes to the transmission system that would likely result in lower or greater outage going forward. We typically assume that there is no transmission curtailment if the project is in a well-established power market--one that is centrally administered with a proven track record of very high reliability--and the transmission system is not undergoing significant expansion. Electricity demand Our assumptions are based on historical demand patterns for the project location and make adjustments to the historical trend to reflect current market developments. To the extent that our demand assumptions are tied to economic factors, we rely on our economic assumptions. Regulation Electricity markets are subject to changing regulation. We typically factor into our analysis the likely impact of regulation that has been approved but not yet implemented. If regulation has not yet been approved but approval is highly likely, we may factor the impact into our analysis. Market exposure case Other than regulation, power projects are mainly exposed to: Power price, base or peak, depending on which market the plant is expected to deliver to; Ability to sell all potential production volume into the market; Fuel cost; Transmission interruption and dispatch constraints; and Exposure to replacement cost for contract underperformance. The key aspects of the market exposure assessment are the level of stress applied, and the duration for which it is applied (see tables 6-7 for additional guidance). Table 6 Market Exposure Assessment: Power Projects MARKET EXPOSURE VARIABLES ASSUMPTIONS Price and volume Typically, a decline in capacity factor: 5% for first-quartile cost profile power projects, 10% for second-quartile power projects, 20% for third-quartile power projects, and 40% for fourth-quartile power projects. In bilateral market with no contract: at least 50% reduction in capacity factor. Curtailment of transmission and fuel supply Typically, a 2% increase from the base-case assumptions. We assume no transmission curtailment if the project is in a well-established power market--one that is centrally administered with a proven track record of very high reliability--and the transmission system is not undergoing significant expansion. Table 7 Market Exposure Duration And Stress Assumptions: Power Projects MARKET EXPOSURE VARIABLES ASSUMPTIONS Historical low We typically assume the lowest price over the last economic cycle, unless mitigating factors justify higher price levels. Historically, a 20-year period has captured a cyclical downside in the power market globally. We would assume a secular/fundamental decline below 20-year lows only if there is evidence that new technological breakthroughs are resulting in a drop in costs. Stress period Generally, the stress period is two to five years. For crude oil, it's no longer than two years. For power markets, it's up to five years. Business cycle and multiple stresses After a downside stress, prices are 90%-100% of base-case levels. For extremely volatile commodities, or those with limited track records, we assume the downside cycle repeats every three years. For commodities with a track record of up and down cycles, the time between cycles is five years. Another important consideration of the market exposure case for power projects is cyclicality. We may incorporate multiple stress periods, simulating the business cycle. We also may deviate from historical trends if we see evidence of technological changes that are likely to result in improving cost economics of supply. Downside case The downside case combines the market exposure case with our operational downside assumptions and financial stresses linked to any refinancing, where relevant (see table 8). Table 8 Downside Case Assumptions: Power Projects POWER PROJECTS VARIABLES DOWNSIDE CASE ASSUMPTIONS Availability 3% decrease from base-case assumption when the ACOS ranges from 1 to 3 (For example, if a solar project has an ACOS of 2 and a base-case availability of 97%, we assume a 94% availability in the downside case.) 6% decrease from base-case assumption when the ACOS ranges from 4 to 6 10%-50% decrease when the ACOS ranges from 7 to 10 Operations and routine maintenance and major maintenance costs 10%-20% increase over base case if technological performance is neutral 20%-40% increase over base case if technological performance is negative Resource and raw materials availability Delivery volume and quality equal to the worst level we expect for this factor over the last 20-year period Performance degradation 3% increase from our base case For solar power projects, degradation 25% above the annual degradation in the base case For solar, wind, and hydro resource projects that may lack operating track records, we assess resource availability and develop the base case and downside case as defined in table 9. For hydro, we typically assume an assessment of P75 or lower if there is reliable resource data over 40-50 years. Given the potential impact from climate change, our downside stresses could be higher where resource availability has been declining in recent years. We typically adjust resource availability (see table 9) if we conclude that the independent expert has limited experience assessing the solar or wind resource regimes or the power project's technology. Table 9 Resource Assessments Under Downside Case: Power Projects ASSET TYPE, ASSET COMPOSITION, AND AMOUNT OF ONSITE DATA INCLUDED IN THE INDEPENDENT EXPERT'S ANALYSIS TYPICAL RESOURCE RISK ADJUSTMENT TYPICAL BASE-CASE ASSUMPTION FOR POWER PRODUCTION PROBABILITY OF EXCEEDANCE VALUE TYPICAL DOWNSIDE CASE ASSUMPTION FOR POWER PRODUCTION PROBABILITY OF EXCEEDANCE VALUE Single solar site--significant data +1 P75/P90 P90/P99 Single solar site--limited data +2 P90 P99 Portfolio of several solar sites - significant data +1 P75/P90 P90/P99 Portfolio of several solar sites--limited data +2 P75/P90 P90/P99 Single wind project--significant data +2 P90 P99 Single wind project--limited data +3 P90 P99 Portfolio of several wind sites--significant data +1 or 2 P75/P90 P90/P99 Portfolio of several wind sites--limited data +3 or 4 P90 P99 P75--An electricity production amount that would be exceeded 75% of the time when assessed statistically on a one-year period. P90--An electricity production amount that would be exceeded 90% of the time when assessed statistically on a one-year period. P99--An electricity production amount that would be exceeded 99% of the time when assessed statistically on a one-year period. When choosing between two assumptions, we look at the project's historical performance and independent expert reports. The downside assumptions will always be more stringent than the base-case assumptions. Asset life assumptions for refinancing risk and future value As part of our refinancing analysis, we typically calculate a project life coverage ratio (PLCR), which compares the present value of forecast CFADS against debt levels. However, for power projects in certain markets, we calculate the PLCR by assessing the value of the project through a dollar-per-kilowatt comparable valuation (instead of calculating the present value of the cash flows). For example, we may value a U.S. 500 megawatt natural gas combined cycle gas turbine plant in a well-established market, such as the PJM Interconnection, at about $1,000 per kilowatt, resulting in a valuation of $500 million. If that plant had $250 million of debt, the PLCR would be 2x. We use the comparable dollar per kilowatt valuation (and not calculate the cash flow-based PLCR) only in markets with established and transparent resale markets where there is available data and entry barriers to new generation are high, providing the asset with an incremental scarcity value that is not captured in the cash flow-based PLCR. To calculate postrefinancing debt service coverage ratios (DSCRs) over the remaining asset life of a power project, we use the asset lives as detailed in table 10. These asset lives may not be from the commercial operations date, but from the year we initiate the ratings, if: The assets are well maintained, or an independent engineer has opined on their useful life, and We believe the asset will remain economically viable through its physical life. These factors are particularly relevant for asset lives of hydro units. In addition, we may assume a longer asset life than those detailed in table 10 when the wear and tear on the asset has been below industry average because of lower usage of the plant, or if we think the plant has been maintained at levels well above industry norms. Table 10 Typical Asset Life Assumptions: Power Projects POWER PROJECT ASSET LIFE ASSUMPTIONS (YEARS) Combustion turbine 25 Combined cycle gas turbine 30-40 Wind--onshore Up to 25 Wind--offshore Up to 20 Solar photovoltaics and thin film Up to 25 Solar tower Up to 25 Coal Up to 40, or estimated economic life Geothermal Up to 25; up to field life Hydro Up to 50 To determine expected asset life assumptions, we consider the asset's actual performance and, if available, input from an independent expert. Take, for example, a combined cycle project that was designed to operate at 60% capacity but actually operated at 25% capacity for many years because of market conditions. The assumed asset life would likely be longer than 25 years, provided that the asset had been properly maintained as scheduled and we assessed the future operational profile to fall within the project's design capabilities. However, if we expect the project to operate at an 85% capacity factor because of limited market supply, we would typically conclude that such a profile exceeds the plant's design parameters, and would, therefore, not assume a longer asset life than presented in table 10. Discussions with independent experts also inform estimates for an asset's life. We can modify the asset life of a project while we do surveillance, depending on performance and major maintenance, and may revise the original assessment. For example, we have fine-tuned our expectation of asset lives for combined cycle gas turbines based on recent independent engineer assessments. Construction Phase SACP--Business Assessment Construction difficulty Power plant design usually includes several components, such as: The design and supply of the power generation system (the physical assets through which electricity is produced); The fuel delivery and conversion system, such as a boiler; and The balance of plant, which includes buildings, concrete foundations, and operations facilities. These contracts may also cover connections to the fuel supply or energy grid, or they may be contracted to third parties not under the power project's direct control. When assessing a power project's construction difficulty and counterparty linkages, we differentiate between the civil engineering tasks, such as balance-of-plant construction, and the technology supplier tasks (see chart 2). A power plant requires synchronization of more moving parts compared with equipment in many other industries, and often manufactured by different original equipment suppliers. Our construction difficulty assessment in these instances reflects the constructing associated with the power block (power island) that is more complex to build than the balance of plant. We may further differentiate material and nonmaterial construction and supply works. Chart 2 Some simple building task power projects that comprise a very large number of modules could face construction delays if logistics are not managed well. This is especially true when importing components from other countries. If we think that weak logistics management would increase the risk of construction delay, we typically assess the construction complexity as moderately complex building or simple civil engineering task instead of simple building task. And this could occur if, for example, we view the logistics management for a large solar power project that comprises millions of solar panels sourced from different manufacturing plants around the world as weak. Project-specific adjustment We can adjust the construction difficulty assessment up by one to reflect that the construction is of a new technology or is more complex and requires the synchronization of moving parts. Technology used.The power sector uses many types of generation technologies. Technology evolves over time, meaning that modest improvements are continually made to a power plant's underlying design. Advancements typically focus on materials or equipment that improve efficiency and reliability or on modest scale-ups. However, sometimes a technology can represent a significant leap for the power industry, such as a new wind turbine that is double the size of the previous turbine. The technologies we assess include: Generators; Turbines; Fuel conversion systems, such as a boilers; Transmission systems; and Solar panels. The track record of the technology used can affect the construction difficulty (see table 11). Table 11 Examples Of Technologies Affecting Construction Difficulty CHARACTERISTICS EXAMPLES EXPECTED IMPACT ON CONSTRUCTION DIFFICULTY A high level of confidence, in our view, of how the project is likely to perform over its useful life in terms of operational performance, costs, life cycle timing, and effectiveness; statistically reliable data that generally indicates very predictable performance and stable operating costs Conventional polysilicon and mono silicon solar photovoltaic panel technology (The commercial period exceeds two decades in numerous locations globally. The panel's degradation performance over a 25-year period is predicable, based on substantial and reliable commercial degradation rate data over the same length of time. Maintenance is easy, with costs well established by the industry.) Positive to neutral A satisfactory operating track record relative to the power project's scope and technology life in a similar application, but the operating period is not long enough to provide a very reliable estimate of operating performance, cost, and life cycle A natural gas-fired turbine that has been used in a large number of power plants and has shown steady performance through at least one major life cycle and good cost predictability Neutral to negative Technology has few applications in a limited number of operating conditions, or project links two proven technologies, but there is uncertainty about the effectiveness of the integration A natural gas-fired combustion turbine that meets the characteristics of "proven" but is operating for the first time on a synthetically produced form of natural gas that may have impurities that could affect the turbine's performance or life cycle; a proven wind turbine designed for onshore use is used in an offshore project Negative Design complexity.Because power plants have been built extensively around the world, their general technology designs are well known. However, some power technology applications have a limited history of design performance, such as offshore wind plants, which may raise the construction difficulty. Many power plants may not have the same design because they are modified to be site specific to accommodate local site and permitting conditions. Local site conditions generally refer to the ground, air, sea, and environmental conditions; plot characteristics; water supply; storage areas; and the presence of other utility infrastructure adjacent to the site. Construction Phase SACP--Financial Assessment Construction base case Some power projects allocate major construction efforts to a key contractor and then fewer to other third parties. One arrangement is where the project employs one contractor for the electricity production system and another contractor for the balance of plant, with neither contractor providing full responsibility for the power project's completion. The electricity production contractor will typically engineer, procure, and construct the production components on foundations established by the balance-of-plant contractor. In these situations, the base case typically includes additional cost and delay that could result from disagreements between the two contractors on the scope, quality, and schedule of construction works. Another typical construction risk allocation arrangement in the power sector is a project using a contractor for the main electricity production components and several other local contractors for the balance-of-plant works. Usually, local contractors perform the balance-of-plant works under cost-plus agreements. The balance-of-plant works could include simple underground cabling to connect an array of wind turbines to a substation, erecting dock and rail facilities for a solid fuel handling system, building natural gas supply lateral to a major pipeline, or erecting the operations and maintenance building. In these situations, we use information from our previous experience with the sector and, if available, from the contractors or independent experts to determine the likely construction cost and schedule impact in the construction base case. Social infrastructure project finance transactions generate revenue from the occupation and use of real estate facilities or the provision of a social or entertainment service to the public. Projects can be availability-based, volume-exposed, or both. For availability-based projects, such as hospitals and schools, revenue is subject to the project meeting contractual requirements to be available for usage. For volume-exposed projects, such as stadiums and hotels, revenue is subject to the amount of usage by the public. The social infrastructure sector includes the following subsectors: Health care assets, such as hospitals, medical facilities, long-term care, and psychiatric facilities; Education assets, including primary and secondary schools and tertiary teaching facilities; Accommodation assets, such as social housing, student and university accommodation, housing for the elderly, hotels, and military barracks; Other social infrastructure assets, including office facilities, detention centers (i.e., prisons), and judicial facilities; Data centers, storage, and archiving facilities; and Entertainment assets, including convention centers, sports stadiums, and arenas. ESG considerations.Among ESG considerations, social factors are often more important when assessing the construction and operations of social infrastructure assets than for other asset types. As an example, we consider the critical role certain assets in this sector play in the public domain, particularly when providing public services, since political risk and regulation by the government may affect a project's performance. Operations Phase SACP--Business Assessment Performance risk Asset class operational stability (ACOS).Social infrastructure assets typically receive assessments of 1 to 3. More simple assets--such as schools, small primary care facilities, and smaller hotels--are at the lower end, and larger and more complex facilities--such as regional acute care hospitals or large prisons with complex service requirements--are at the higher end (see chart 3). We may raise the ACOS if a project faces special circumstances weakening the stability of operations and performance risk, be it related to the location, the purpose, or technology involved, or any other factor. Chart 3 Project-specific attributes.The following are examples of project-specific analytical considerations that may affect the operating performance of social infrastructure projects, which would lead us to modify the ACOS. Although uncommon, performance redundancy is favorable if a project has more facilities than required to meet the performance threshold. Positive examples are a prison with triple security redundancy, a data center with material redundancies to ensure power-up time above the typical requirements, and an accommodation project that gets full payment with 75% of rooms in service. At the other extreme, a complex hospital with critical patient care that lacks a backup power system would be more exposed to interruptions, which may hurt performance. Low operating leverage, which may benefit the ACOS, could occur if the concession provider retains a material portion of the operating tasks, rather than the project being responsible for the tasks. For example, a project may be required to construct three student accommodation buildings, but then only be responsible for operations at one of the buildings. Key technologies employed, such as the computers in a data center or complex medical equipment in a health care project, are often retained by the concession provider. As a result, risk of their failure or underperformance typically does not affect project performance. If project scope does include such items, we may reflect the higher technology risk. In most cases, projects in this sector are designed to operate above minimum contract standards, and contract terms typically allow for moderate underperformance. Lower performance requirements can be beneficial for a project. A positive example would be a hospital with an unusually high failure threshold for underperformance, which protects the project from penalties even under a stressed scenario. Conversely, a harsher penalty regime than commonly seen in relation to temperature or humidity at a data center may result in accumulation of penalties sufficient to allow potential termination of the leases. Regulatory risks.These are important considerations in our analysis of social infrastructure projects because the assets are often operated under public-private partnerships with detailed operational requirements related to safety, hygiene, and public interest. If the project has material exposure to changing requirements from oversight entities, such as sports regulators, university system requirements, or occupational health and safety regulators, then, absent mitigants, that situation may affect its performance and cash flow stability. The result may be a negative adjustment and an increase in performance risk. Market risk Market exposure.Market exposure is not material for availability-based projects. However, for volume-exposed social projects, it can vary widely depending on the drivers for occupancy or usage. Therefore, for volume-exposed projects, we also consider market exposure case assumptions. For example, a convention center hotel's occupancy is correlated to the activity at the adjacent convention center and affected by competing hotel alternatives. Some sports facilities have a strong history of season ticketholders and membership waitlists. Other facilities are more exposed to the correlation between on-field performance and attendance levels, which may affect ancillary revenues. Table 12 Market Exposure Assessment: Social Infrastructure Projects PROJECTED DECLINE IN CFADS FROM THE BASE CASE TO THE MARKET EXPOSURE CASE (%) ASSESSMENT TYPICAL EXAMPLES <5 Not applicable Projects with availability-based revenue 5-15 Low Projects with predominately contracted or availability revenue but with some price or volume exposure--for example, student housing with stable occupancy or minimum occupancy guarantees 15-30 Medium Student accommodation with higher historical variation, hotels with higher-than-typical fixed revenue versus volume-exposed revenue, stadiums with a high percentage of contractually obligated revenues versus gameday or matchday volume-exposed revenues 30-50 High Typical stadium or arena ticket revenue-based deal, fully volume-exposed convention center hotels >50 Very high Projects with highly volatile revenue, such as sports media or advertising revenue that is vulnerable to team relegation or underperformance Note: Base case and market exposure case are defined in section 4 of the criteria. CFADS--Cash flow available for debt service. Competitive position.We look at several analytical factors in aggregate to determine the competitive position assessment for different types of social infrastructure assets. For projects with availability-based revenue or fully contracted projects, such as social housing, hospitals, and prisons, competitive position typically is neutral. However, we may assess it differently if we expect the competitive factors described in tables 13-16 may weaken the creditworthiness of the project. For projects with volume-exposed revenue, a weak business purpose, strong competitors, or a concession provider with different commercial incentives could result in a weak competitive position assessment, and vice versa. Table 13 Competitive Position Assessment: Accommodation COMPETITIVE FACTOR MAIN CHARACTERISTICS ANALYZED EXAMPLE IMPACT Commercial incentives Are there contractual or commercial incentives to maximize occupancy? How is the marketing relationship between project and concession provider? The project is marketed as an independent student accommodation provider separate from a related university. Negative The contract includes a minimum occupancy guarantee. Positive Competing supply Are there contractual commitments to build no competing facilities, or other alternatives are limited or difficult to build? Does the building have superior location or design versus alternatives? The project is located on a university campus. Positive The project is unable to differentiate its offering through location, quality, or services provided. Negative Price sensitivity Has the project demonstrated the ability to increase prices with limited impact on occupancy? Occupancy levels are insensitive to price increases, or prices are significantly below market. Positive Occupancy history Has the project shown strong and stable occupancy through the economic cycle? Occupancy has been hurt by economic conditions or, in the case of student accommodation, by university ranking changes. Negative Table 14 Competitive Position Assessment: Office And Data Centers COMPETITIVE FACTOR MAIN CHARACTERISTICS ANALYZED EXAMPLE IMPACT Commercial features Are there contractual or commercial features to maximize occupancy or minimize turnover (minimum occupancy or revenue guarantees, best location)? These include long-term leases, as well as triple net leases that require investment by the occupants, which would reduce turnover. Positive Competing supply Is there limited ability in the market to build competing facilities? The location has a lot of nearby undeveloped sites. Negative Price sensitivity Does the project have the potential to increase price with no or limited impact on occupancy? Prices are below market so there is substantial upside potential, or there are few alternatives in the market that would allow the project to raise prices without affecting capacity levels. Positive Occupancy history Has the project shown strong and stable occupancy through the economic cycle? Past unfavorable economic conditions have led to lower occupancy. Negative Note: A data center is a building, a dedicated space within a building, or a group of buildings used to house computer systems and associated components, such as telecommunications and storage systems. Table 15 Competitive Position Assessment: Hotels COMPETITIVE FACTOR MAIN CHARACTERISTICS ANALYZED EXAMPLE IMPACT Market position

Does the hotel receive a consistent premium over similar competitive hotels? We generally look at project RevPAR (revenue per available room) and volatility through the economic cycle. The hotel's rates are below similar hotels and suffered higher vacancy during a recent economic downturn. Negative Market strength How does the local market perform relative to comparable markets when measured by RevPAR or other market indices? The local market is in a main city and has RevPAR significantly above the average. Positive Asset condition Is the hotel newer or better maintained than others in the market? The hotel is aging, not well maintained, and has an older design compared with others in the market. Negative Pricing elasticity Does the hotel maintain a higher market pricing premium than its competitors and is pricing relatively insensitive to local and regional trends? The hotel average daily room rate falls faster and rebounds slower during economic cycles than its competitors. Negative Table 16 Competitive Position Assessment: Stadiums And Arenas COMPETITIVE FACTOR MAIN CHARACTERISTICS ANALYZED EXAMPLE IMPACT Demand How correlated are attendance and fan support to team performance and economic downturns? The stadium saw material attendance drops during periods of team underperformance or an economic downturn. Negative Market share At what level does the facility attract fans and sponsors compared with other local entertainment options or competing clubs? We often measure this factor by comparing occupancy, average price, or renewal rates for the facility and premium products, such as suites and club seats, relative to others in the market and the league. The facility maintains high occupancy and season ticket renewal rates, and stronger pricing than others in the same market or league. These trends are generally present even in weaker economic periods or times of poor team performance. Positive Market strength What is the level of wealth in the regional market, the number of alternative local entertainment options, and strength of the fan base relative to competing teams? The regional market is small, or the fan base is declining. Negative Pricing What capacity does the project have to raise prices for tickets or premium offerings, at times more than inflation, compared with the league or regional averages? The project has demonstrated the ability to raise and maintain ticket pricing through an economic cycle or when team performance is relatively poor. Positive Operations Phase SACP--Financial Assessment Availability-based projects--forecast assumptions Base case.The base case is informed by our macroeconomic assumptions, which affect inflation-linked revenue, and performance deductions. Forecasted performance deductions are based on our assessment of the required performance standards compared with the experience and abilities of the project or operations subcontractor. Downside case.The downside case focuses on higher cost assumptions, increased deductions, and the impact of failure of contractors. If the base case assumes an experienced and creditworthy operator (i.e., rated at least at the level of the project)is performing the operations, we do not assume a failure of the contractor in the downside case. But, we might assume a poorer level of operational performance that could lead to higher deductions or costs. Market exposure case.We typically don't assess the market exposure case for projects with availability-based revenues because we anticipate minimal variation in the cash flow available for debt service--from our base case--due to price or volume. Table 17 Availability Projects: Base And Downside Cases VARIABLE BASE-CASE ASSUMPTIONS DOWNSIDE CASE ASSUMPTIONS Availability revenues Generally, the assumptions are in line with contractual terms. Third-party revenues from one-time events could be included based on our expectations of future activity. An example is a summer corporate offsite meeting at a student accommodation facility that would otherwise be unoccupied during the summer. These are the same as the base case, except for third-party income, which we typically consider only at guaranteed levels. Abatements/deductions When the project has contracted operations to a service provider, in most cases deductions are passed through in full and do not affect our base case. However, the base case includes these costs if the project itself performs the services or retains deduction risk, or if the deduction cap under the service contract, if any, is exceeded. When the project has contracted operations to a creditworthy service provider (that is rated at least at the level of the project), deductions are passed through in full and do not affect our downside case--unless the deduction cap, if any, under the service contract, is exceeded. In other instances (i.e., the service contract is with less creditworthy counterparty), where the project has an operating history, we typically apply financial deductions assuming poor operational performance within the sector. Alternatively, if there is no history, we might rely on comparable projects and market studies. Hard and soft facilities management

Generally, these are in line with contractual terms, but, for replaceable counterparties, we may adjust if not consistent with current market prices. If uncontracted, we consider likely costs based on independent engineer (IE) reports and our experience. Typically, the downside case assumes each contractor that is not rated at least at the level of the project is terminated and replaced at a premium based on market conditions, with a price increase generally 10% above the base case. (This could vary based on comparable projects and IE opinions.) Hard facilities contractors are generally assumed to be terminated earlier than soft facilities contractors. Life cycle costs We forecast future life cycle spending based on contractual requirements and market pricing. We typically adjust our projection as life cycle spending evolves: Typically, we consider a 10% increase in all costs. If work is contracted to a replaceable counterparty, cost is based on our assessment of the replacement life cycle contract terms. --If the project provides a reprofiled life cycle budget plan, subject to IE opinion on its sufficiency for the remainder of the concession or comparison with peers; --If the project meets all contractual requirements but is consistently above or below budget; or --If the project has delayed life cycle spending or is facing latent defect costs. We would also adjust budget in our downside for reprofiling and under- or overspending in a similar way to the base case. We only give benefit to previous life cycle underspending if those amounts are in a dedicated reserve for future spending. Life cycle timing Our opinion is informed by IE reports and our experience. If relevant, when a project lacks control over timing of life cycle spending, we may shift a portion of the largest expenditure earlier relative to the base case. If there are hand-back requirements planned to occur in the last few years of the concession, we would only shift them if, in our opinion, they are likely to occur earlier than scheduled. Energy volumes and costs Our expectations are informed by IE opinion and past experience. Costs will be generally in line with contractual terms or market standards. We typically assume volumes up by 5% and costs to be at the maximum contracted exposure or the worst-case prices seen over a similar operational period. Project company management costs Our expectations are informed by IE opinion and past experience. Base-case costs typically increase by 5%. Volume-exposed projects--forecast assumptions Base case.The following considerations inform the base case for volume-exposed projects: The project's location, local market, and the competition, including newer competing facilities over time; Historical occupancy or attendance levels and pricing rate, the presence and strength of marketing relationship with the concession provider, incentives from the concession provider to fully occupy the facility (which could involve available space, beds, rooms, or seats and be supported by minimum occupancy guarantees), and price sensitivity; The impact of any revenue contracts that may mitigate volume and pricing risk, such as pledged or guaranteed revenues; Funding for the replacement of furniture, fixtures, and equipment (FF&E;) and major maintenance works (the schedule and cost for these activities are adjusted based on our forecast of occupancy levels); and Aging of a facility over its useful life, which implies increasing maintenance costs. Market exposure case.The market exposure case is based on the following considerations: For accommodation assets, new competitors are entering the market, or the prime competitive driver is weakening (for example, weakening of the university ranking). For data centers and office and storage projects, we assume the worst market conditions witnessed over a reasonable time horizon, if those are to be expected in the future. Alternatively, we incorporate our future expectations. For stadiums and arenas, we assume a poor team performance. If there is a material risk of a work stoppage or player strike, then we typically apply a one-year work stoppage during the debt term. If a team has a reasonable chance of relegation to a lower division, then we would assume a relegation will occur. For hotels, we assume material increases in local room count through new hotels or alternative short-term private accommodations entering the market, or a reduction in local convention activity. Social infrastructure projects may include financial structures to mitigate the impact of potential interruptions to operations or revenues, such as a dedicated reserve account or liquidity facility. If such financial structure adequately mitigates the risk of cash flow disruption, our market exposure case will exclude the impact of the interruption on cash flow available for debt service if the reserve fully covers the associated impact. For example, a U.S. stadium project may have a dedicated reserve available to fund operations in the event of a work stoppage related to player contract renegotiations. When a project uses a reserve to mitigate a potential interruption, we assume it is not available for other purposes and exclude that reserve from our remaining liquidity analysis. Downside case.We stress operational assumptions on top of the market variables as per tables 18-21. Table 18 Volume-Exposed Accommodation Projects (Excluding Hotels): Base, Market Exposure, And Downside Cases FACTOR BASE-CASE ASSUMPTIONS MARKET EXPOSURE CASE ASSUMPTIONS DOWNSIDE CASE ASSUMPTIONS Revenue We base assumptions on historical trends in occupancy rates, strength of the marketing, and revenue guarantees (if occupancy falls below a specified threshold). Projects may rent facilities on an annual basis or have fixed rate adjustments. For projects that are only paid for occupied facilities, we examine the contractual features--such as minimum revenue guarantees, the market dynamics for local accommodations, and historical trends in occupancy--to develop a reduced revenue scenario. Same as market exposure case Operating expenses Base-case assumptions are aligned with market standards. Upon renewal or for uncontracted expenses, we typically look to comparable projects and market pricing. Same as base case We typically assume operating costs are 5%-10% higher than the base-case forecast, with variable costs scaled to changes in volumes. Furthermore, operating and major maintenance costs are likely to increase by 2%-5% in the final years of the project (generally the last 20% of the project asset life). Table 19 Volume-Exposed Data Centers And Office Projects: Base, Market Exposure, And Downside Cases FACTOR BASE-CASE ASSUMPTIONS MARKET EXPOSURE CASE ASSUMPTIONS DOWNSIDE CASE ASSUMPTIONS Revenue We base assumptions on historical trends in historical occupancy rates, strength of the marketing, length of contracts, and revenue guarantees (if occupancy falls below a specified threshold). For projects that are only paid for occupied space, we develop a lower occupancy case based on the combined impact of project features such as minimum revenue guarantees, the market dynamics for the sector, and historical trends in occupancy. For other projects, we consider contractual support, such as minimum occupancy guarantees. Same as market exposure case Operating expenses The base-case assumptions are aligned with market standards. Upon renewal or for uncontracted expenses, we typically look to comparable projects and market pricing. Same as base case We typically assume operating costs are 5%-10% higher than the base-case forecast, with variable costs scaled to changes in volumes. Furthermore, operating and major maintenance costs are likely to rise by 2%-5% in the final years of the project. Table 20 Volume-Exposed Hotel Projects: Base, Market Exposure, And Downside Cases FACTOR BASE-CASE ASSUMPTIONS MARKET EXPOSURE CASE ASSUMPTIONS DOWNSIDE CASE ASSUMPTIONS Revenue For operating projects, we consider the market's current and historical average RevPAR (revenue per available room) growth rate, as well as the impact of capacity added to the market to forecast future performance. Typically, we expect growth in RevPAR will slow as occupancy stabilizes and room rates will move in line with inflation. For new projects, we may apply a premium over similar competitive hotels depending on our assessment of local demand. RevPAR growth typically decreases by at least 50 basis point relative to base case. In the final years of a project, we also assume deterioration in its ability to compete, as facilities age and alternatives open. Room block agreements tend to be lower than contracted because they are often postponed or cancelled. Same as market exposure case Ramp-up We forecast length of ramp-up based on our view of the effectiveness of management's marketing strategy and short-term group bookings. Other factors include the strategy of competing facilities, such as discounting the average daily rate, or renovation projects to compete with the new hotel. We may consider a weaker ramp-up, depending on market conditions. Same as market exposure case Operating and maintenance and major maintenance costs (in absolute terms or as an operating margin) Expenses are aligned with market standards. They are determined by the hotel's pricing power, regional labor costs, and fixed obligations, such as property taxes and utilities. Upon contract renewal or for uncontracted expenses, we typically look to comparable projects and market pricing. Same as base case We typically assume operating costs are 5%-10% higher than the base-case forecast, with variable costs scaled to changes in volumes (for example, room cleaning may cost more per room, but fewer rooms require cleaning). We also typically increase expenses in the final years of a project to reflect the aging of the facility. If a hotel has consistently low occupancy, then the major maintenance cycles may be less frequent. We also assume operating and major maintenance costs accelerate by 2%-5% per year in the final years of the project. Table 21 Volume-Exposed Stadium And Arena Projects: Base, Market Exposure, And Downside Cases FACTOR BASE-CASE ASSUMPTIONS MARKET EXPOSURE CASE ASSUMPTIONS DOWNSIDE CASE ASSUMPTIONS Ticket revenues and attendance We base ticket revenues and attendance on the historical averages over a representative stabilized period, adjusted for new capacity, seating configuration, market factors, and pricing premium. Ticket revenues and attendance are lower than the stabilized base case, and the decline varies based on the sports league, the facility's competitive position, historical trends in attendance in stressed market conditions, and feasibility studies for new assets. For leagues without relegation risk, the stresses typically are a 5%-25% reduction, while stresses are typically 15%-50% for leagues with relegation risk, depending on the facility and strength of fan support and other team strengths. The level of stress could vary depending on track record and expectations. Same as market exposure case Contractually obligated income, such as from premium suites, club seats, and naming rights This income is as contracted until the expiration of the current contracts. Re-contracting rates and terms are based on historical performance at the facility, general market trends for these contracts, and the relative strength of this facility's franchise. For projects without an operating history or in a competitive market, we generally assume a price decline of 5%-10% at the major renewal point, which typically occurs every 15 years. For uncontracted inventory, we generally assume a portion is sold, either under short-term or individual game-day contracts, based on our experience with historical market demand. For new stadiums, we generally assume a maximum occupancy of 70%, regardless of the sales of remaining uncontracted products, unless this can be substantiated by premarketing programs or strong interest from existing patrons. Upon each contract renewal (or renegotiation upon relegation of a team to a lower division), we assume a larger price decline than in the base case, based on historical trends under stressed market conditions. For projects without an operating history, we typically assume an additional stress of 5%-15%, or a multiple of this if there is relegation risk. If we think the facility is highly competitive, allowing it to retain greater pricing power, we may reduce the severity of the price stress. Same as market exposure case Turnstile/game-day revenue (including from food and beverage, parking) Turnstile revenue is tied to annual attendance. If the contract includes guaranteed minimum revenue, then we include the minimum revenue. Revenue would increase in line with our view of historical performance and market demand. Revenue is based on the downside attendance levels, though minimum contractually guaranteed revenues provide a floor. Same as market exposure case Non-sporting-event revenue (such as from concerts and family shows in a stadium) In places where these activities would be permitted, we may include non-sporting event revenues if there is a track record. For new facilities, we typically rely on feasibility reports. We may include non-sporting-event revenue but assume it's commensurate with historical levels during an economic downturn. For new facilities, we rely on feasibility reports, and we may include those revenues with a haircut if the new facility has a strong business position and location. Same as market exposure case Operating costs Operating costs are based on trends over the last three to five years of stabilized operations. For projects without an operating history, we rely on our experience and independent engineer reports. Costs typically are highest in the opening year, then decline to a stable level over the next few years (typically 10% lower). Costs typically grow in line with inflation, and are 0.5% higher in the final years of the project. Same as base case, except variable costs may be adjusted in line with change in attendance We typically increase operating costs by up to 10% or the five-year average over the base-case forecast, with variable costs scaled to changes in volumes, to reflect our view of the steady state. In the final years of the project, we typically assume major maintenance costs rise by 2%-5% per year. Major maintenance We typically increase major maintenance expenses by 0.5% annually in the final years to cover increasing needs in an aging facility. Some major maintenance expenses will result from usage, in addition to market factors and facility age. We adjust this requirement based on our view of attendance and changes in consumer tastes. Same as base case Same as for other operating costs. If the project has not stabilized, then we increase maintenance costs by up to 5%, or the relevant historical average, to reflect our view of the steady state. Counterparty dependencies When a social infrastructure project receives revenue from a government entity--either in the form of availability or usage payments--this is generally a commercial obligation for the government entity and may not have the same seniority as its financial obligations. We have seen projects that faced changes in contractual terms because of political decisions, as well as projects that continued to receive payments from government entities that met their commercial obligations while they defaulted on their financial obligations. Such risk is accounted for in our counterparty dependency assessment, or through changes to the project OPBA (operations phase business assessment) or cash flow projections. Asset life assumptions for refinancing risk and future value Many social infrastructure projects (volume and availability based) operate under concessions and do not face refinancing risk or have much residual equity value at the maturity of project debt. However, for those that do, we generally base our asset life assumption on the lower of the concession life or the maximum asset life. Asset life may be longer if an asset is well maintained and a strong major maintenance plan is in place. Asset life may be shorter if a project faces uncertainty in physical maintenance costs (for example, being located in a corrosive environment by the ocean), or if future demand faces increasing uncertainty (for example, whether jail sentences will be reduced as politics evolve, or whether universities will move to more online and remote learning). Table 22 Typical Asset Life Of Social Infrastructure Projects ASSET TYPE TYPICAL ASSET LIFE Social infrastructure projects operating under a concession 50 years or the length of the contracted concession period--whichever is shorter Other social infrastructure projects Up to 50 years Construction Phase SACP--Business Assessment Construction difficulty Social infrastructure projects are generally on the less complex end of the construction difficulty scale (see chart 4). These projects commonly utilize proven construction techniques, design approaches, and off-the-shelf technologies and can rely on historical cost and performance data in the building industry for developed markets. Often concession providers retain the most technically complex parts of the facilities. (For example, a hospital owner may install and operate MRI machines and intensive care equipment at a hospital, and project responsibilities for a data center may be just building services and security.) We may increase the construction difficulty assessment if the project is responsible for some of these more complex items. Chart 4 Project-specific attributes Social infrastructure projects typically have limited exposure to untested technology or design complexities, so this factor is likely to be neutral. Nevertheless, some assets may have additional technology complexity--for example, stadiums with retractable roofs or seating as well as video and scoreboard displays. In those cases, we consider the ease of construction and difficulty of commissioning for the different components to decide whether to adjust the construction difficulty assessment. Technology used.Most projects will use off-the-shelf building management, heating, and ventilation systems, which we consider having sufficient operating history under specified operating conditions. In most cases, contractual mechanisms will likely limit the risk that the project company faces if there is material technology risk. For example, medical imaging equipment risk is often mitigated by protecting the project from default risk if the technology fails to perform. If these mechanisms are absent or ineffective and the technology is less well-proven--such as a new medical imaging system--then we might consider worsening the construction difficulty assessment. Design complexity.Social infrastructure projects are often constructed in brownfield sites (where projects or developments previously were built) and can face increased design complexity as a result. Common causes of complexity in this sector include existing site conditions, the impact of underground structures such as subways and utilities that are expected to be relocated or avoided, inadequate site surveys, constrained site access, and requirements to refurbish or convert existing buildings rather than new construction. Another feature of social infrastructure projects that may increase construction difficulty or raise project management risks is a project scope that includes managing existing facilities while building a new facility. Such a project would face complexity related to access, safety, and non-interruption of existing services during the construction of the new facility. Construction Phase SACP--Financial Assessment Construction base case Engineering, procurement, and construction (EPC) contracts are common in this sector to minimize risk of construction cost overrun or delay. Since the relative complexity of the assets is usually low, we often see smaller or less experienced contractors--meaning counterparty risk and project ability to replace contractors is relevant. However, the limited technical complexity and short timeframe often mean replacement contractors are available, which mitigates some risks. Some social infrastructure projects choose to transfer a lower level of risk to contractors through alternative contracts such as engineering, procurement, construction, and management (EPCM) or based on time and materials. This approach allows the project to retain management of specific tasks, including procuring and installing specialized equipment, such as large-scale scoreboards at stadiums, upscale furnishings, or specialized technology. This approach will add risk but may be mitigated through higher levels of contingency in time and budget. We may adjust the base case cost and timing for those areas the project retains, subject to our experience with project performance in the sector and any available reports from independent experts. Transportation infrastructure projects derive most of their cash flows from the commercial operation of airports, ports, toll roads, bridges, tunnels, railways, and other transportation infrastructure assets and services, such as navigable waterways and air and marine traffic controllers. ESG considerations.Environmental and social are the most relevant ESG factors for transportation projects. Airports, for example, can face large exposure to health and safety factors and community opposition. During the COVID-19 pandemic, airport activity completely stopped for a few months before recovering only gradually. The pandemic also strongly hit mass transport, while toll roads recovered much faster after the lockdowns ended. The road and rail subsectors are exposed to community opposition and government consultations owing to price affordability issues. Climate transition risks are also important for the transport sector but overall have a benign credit impact because emissions are mainly indirect among its users (airlines, cars, trucks, and shipping). Physical risk, notably rising sea levels, is particularly relevant to ports. Operations Phase SACP--Business Assessment Performance risk Asset class operation stability (ACOS).ACOS varies across transportation projects (see chart 5): Roads on relatively flat terrain and simple overpasses and underpasses with no complex bridges or tunnels and traffic controllers are usually assessed as 1. Difficult to forecast operating costs--for example, due to roads subject to extreme weather conditions--or more complex operations, such as in managed lanes projects, typically have an ACOS of 2. Large-span bridges or tunnels generally are a 3 or 4 if they show above-average complexity or have associated life cycle costs difficult to forecast. Airports are typically 3 because they don't retain responsibility for air control, which would add complexity to operations. However, that could be higher or lower depending on specific attributes of the asset. For instance, airports with maintenance obligations only or no operations responsibility, as well as small airports, could receive lower assessments. On the contrary, larger airports with more complex infrastructure, including multiple runways that operate in parallel in complex terrain, could receive higher assessments. Simple ports can have an ACOS of 3. Water ports with complex logistics due to large scale or scope of operations (for example, high-volume container lifting, dry and liquid product storage, and intermodal rail takeaway services) are typically 4. Railways also frequently are between 3 and 4, depending on the geological characteristics, the requirement for specialized maintenance skills, or the absence of a dedicated guideway that, in our view, could increase operational risk. Navigable waterways and underground complex subways with significant tunnels are typically between 4 and 5. We do not expect to assign higher ACOS assessments for transportation projects, though we might if new asset classes emerge for which firm conclusions on performance are not available or if a project in any of the asset classes listed above presents uniquely complex features. Chart 5 Market risk Market exposure assessment.Depending on the type of asset and main contractual characteristics, transportation projects could face different degrees of volatility in volumes or prices. For roads, subway operators, railroads, airports, and ports, volatility commonly stems from the exposure to traffic levels, fees, and tariffs fluctuations. In general, more mature transportation assets tend to have lower volatility and, therefore, relatively low market risk exposure. Competitive position.Transportation projects' ability to attract traffic or gain volumes from competitors and grow depends on several factors, including the asset's rationale (i.e., the reason it was built), competitiveness, and user characteristics. We assess the project's strengths and weaknesses in aggregate to determine the competitive position (see table 23). For projects with availability-based revenue or fully contracted transportation projects, competitive position typically is neutral. However, we may assess it differently if we expect the competitive factors described in table 23 may lower the creditworthiness of the project. Table 23 Competitive Position Assessment: Transportation Infrastructure COMPETITIVE FACTOR MAIN CHARACTERISTICS ANALYZED EXAMPLE IMPACT Transportation asset rationale Are the origins and destinations (O&D;) linked to other transportation assets and major economic or population centers? An airport located near a capital city that is the main international gateway to the country or a subway operator that joins highly populated areas Positive Are there interurban radial facilities (e.g., a river crossing) with defined single-purpose traffic? A road that represents a small proportion of the total end-to-end average journey, and time saving is insignificant compared with alternative routes Negative Does the asset represent a significant proportion of the total end-to-end average journey and time saving is significant compared with alternative routes or competition? A road that is a stand-alone facility with no link to any other major network Negative Competitiveness (value proposition compared with competing facilities) Is there no, bad-quality, or heavily congested alternative free competition? Positive Are time and operating cost savings clear and significant? A navigable waterway that shortens trips by 10 days Positive Does multimodal competition exist? Multimodal competition exists, with no clear value for money advantage provided by a road Negative Does the project have a record and strong contracts ensuring passive protection (competing facilities will not be built or upgraded) and active protection involving government action (traffic or volume-calming)? A port that has issues with the autonomous government that decided to grant a competing facility Negative Organic growth drivers Does the project operate in a relatively stable and diversified local economy? A subway operator located in a volatile and undiversified local economy with a high unemployment rate Negative User characteristics Is there a reliance on commuters or other frequent users (more than 80%-90% of revenues)? A toll road that has high less-time-sensitive traffic (more than 60% of revenues) Negative Are O&D; the majority of all trips? Are O&D; more relevant than transits? Is there a strong dependency from cargo? O&D; represent 90% of total traffic at an airport Positive What is the demand profile (time of day, day of week)? A toll road with high seasonal demand Negative Note: O&D; passengers are those boarding at the first or last points of a one-way itinerary. Transits are connecting passengers boarding at intermediate points in a one-way itinerary. Operations Phase SACP--Financial Assessment Base case Revenues--volume-exposed transportation projects.The base case for a project depends on its maturity. Transportation assets with established traffic or volumes typically have sufficient historical data that we can use to build the base case. Conversely, a greenfield transportation transaction has no or limited history, and we base our expectations on our own experience, that of peers when available, and information from independent experts. For mature assets, we assume that the historical correlation between traffic and relevant macroeconomic variables continues. (Those variables could include GDP, population, or employment.) Moreover, we can distinguish performance of different traffic or volumes--for example, if heavy traffic on a road has been more sensitive to GDP than light traffic, we include that in our forecasts. The same goes for varying performance among international and domestic passengers in airports. However, as traffic or volumes increase to an asset's full capacity, we temper and eventually flatten our growth assumption. In that situation, revenue growth results solely from increases in the rates or tariffs. If rates or tariffs are, in our view, high relative to an area's socioeconomic levels or to competition, we may reduce the revenue growth rate when we expect congestion will increase as the asset's economic value for the users diminishes. Alternatively, we might freeze it to avoid deviation to alternative routes. Moreover, if toll road users are expected to oppose tariff increases because of social aspects, lower tariff rate assumptions could apply. Lastly, in some instances, historical patterns might not be representative of future traffic growth, owing to, for instance: The construction of a new airport in an adjacent area that might dilute passenger volumes, The creation of a new competing toll road that might raise traffic levels, A change in the dynamic of the operation (an asset that moved away from being a hub to an origin and destination), or Changes in consumer preferences. In those instances, we adjust the historical patterns to incorporate the expected impact on traffic or volume growth. When determining the correlation between traffic growth and macro variables, we do not use a specific formula. Instead, we rely on historical trends and compare variations of each variable. For example, if a passenger railroad's annual traffic growth over 10 years has been consistently one to two percentage points lower than GDP (or elasticity to GDP lower than 1x), and we believe this pattern is representative of future performance, we could retain the same difference in our forecast. Similarly, if historical growth appears to be a function of population growth and GDP, our forecasts incorporate those characteristics. Revenues--availability-based transportation projects.Although a detailed traffic or volume forecast is not critical for availability-based projects (because revenue paid to the project is not a function of the total number of users), we still monitor likely traffic or volumes levels given their implications on operations and maintenance costs, as well as on life cycle replacement. Other base-case assumptions.In addition to traffic or volumes forecasts, the base case reflects other assumptions that affect cash flows, including: Rates or tariffs (as applicable); Other commercial revenues for airports, ports, and railroads/subways; Operations and maintenance costs; Life cycle replacement costs; General administration costs; and Where relevant, revenue abatements for failure to comply with contract requirements (typical for availability-based road projects).

To forecast revenue, we typically assume that rates or tariffs vary as permitted or imposed under the concession agreement (including rate reductions, if required). If rate increases are subject to a third party's approval, they could increase at intervals greater than allowed for countries or regions with no established track record, or where we have concerns about timeliness of approval. For a project with a poor track record, we may not consider the increase until it has materialized. To forecast commercial revenue, we rely on history if available. Other relevant variables include the square meters in a passenger terminal that will be available for rent and contractual features that stipulate pricing. We assume operations and maintenance costs, and life cycle replacement costs considering our own experience, peers when available, and information from independent third parties. We may, however, adjust the timing of life cycle replacement so that it is in line with our traffic or volumes forecast (e.g., the traffic level at an airport significantly influences the resurfacing of a runway) or deviate from there if, for example, there is a bad track record. Projects that are exposed to revenue abatement or financial penalties for failure to comply with contractual requirements typically pass on this risk to the project's operator. Accordingly, the base case generally does not include deductions. However, we assess the impact of the operator's failure to meet its contracted service obligations and the consequences this could have under its contractual agreements. If an availability-based project is performing operations, then the base case includes expected deductions depending on the payment mechanism's terms. Market exposure case We base the projected decline in the cash flow available for debt service in the market exposure case typically using the following assumptions, which are correlated to the transportation asset's operating history. For transportation assets with established traffic or volumes, we typically forecast a reduction commensurate with a past downcycle. Take, for example, a port that showed a drop in volumes handled of 5% annually for three consecutive years in a recent economic recession followed by a convergence (or recovery) toward the base-case levels. If we think the port is likely to face such stress again, we might include this trend in the market exposure case. Some downcycles might not repeat with the same severity or frequency, so we use our judgment when determining the severity and frequency of stress. For instance, if stressing traffic performance for an airport, we might conclude that a decrease in passenger flows, like the one during the first phase of the COVID-19 pandemic (with very strict bans), is too harsh and instead incorporate a more moderate haircut. In addition, if the downcycle could extend for more than five years, based on historical performance (or vice versa), we might extend the stresses. Lastly, historical performance during downcycles might not be representative of future traffic stress because of, for example, fundamental changes in the market or a surge in competition. In this case, the market exposure forecasts contemplate the effect that those market changes and competition might have on relevant variables like traffic or volume. For greenfield transportation assets, and those still ramping up, the market exposure case generally assumes an extension of the ramp-up phase by three to five years and traffic or volume following the ramp-up phase 10%-20% lower than the base case. We also remove any induced traffic. (Induced traffic is the additional traffic that will come from assumed residential, commercial, or industrial properties being developed on the back of the asset's construction.) For projects that don't have established performance, the extent of the traffic or volume reduction will depend on the nature of the traffic or volumes. For instance, more commercial vehicles on a road generally results in higher traffic volatility in an economic downturn, whereas a high level of commuter traffic is more resilient. Also, airports with a higher proportion of origin and destination passengers are typically less volatile than transits--and vice versa. Finally, the higher dependency on cargo in railways makes a project more vulnerable to economic conditions. For some asset classes, including managed lanes, we focus on total revenue and typically assume a longer period of no growth given their reliance on high levels of congestion on alternative free roads. As the transportation project's traffic growth rate recovers to levels in line with growth before the downturn, the toll-free alternative road--rather than the managed lanes--will initially benefit. The reduction would generally last five years. We typically apply a reduction of 5%-15% for the initial two years, and then halve the revenue drop for the subsequent three years (e.g., an 8% drop--relative to the base case--for the initial two years and a 4% decline the next three years). The degree of the revenue decrease considers the characteristics of the asset and its users, such as local wealth, employment, and prevalence of free alternatives. We typically assume that rates or tariffs increase by the maximum allowed under contracts. For countries or regions where the tariff or rate culture is not established or is uncertain, we generally assume partial or no increase. We also contemplate downward adjustments if stipulated in the concession contracts. Downside case Unlike projects in other sectors, including real estate transactions, transportation projects may operate and maintain assets without recourse to long-term operations and maintenance contracts that transfer price and operational risks to a third party. One of the reasons for this is the lower operating costs as a percentage of revenue compared with real estate or power projects. For example, mature transportation assets generally demonstrate high profitability, with EBITDA margins often higher than 50%. In the downside case, we assume moderate cost increases relative to the base case, including typically 10% higher operations and maintenance cost, 10% higher life cycle costs, 10% higher energy usage and prices, and 5% higher project management costs. We also increase the frequency of maintenance that could be for roads and runways resurfacing and reduce the length of time between two scheduled resurfacing dates by 12 months from the base-case forecast. (The timing also considers the lower traffic volumes the market exposure case establishes.) Structural changes in the market for the contracted services, economic conditions, contractor- or project-specific factors, and less developed markets may lead to higher costs in the downside case. For projects exposed to abatements (common for availability-based roads), the downside case generally includes deductions due to poor performance, as determined by the project's independent expert (if available) and our experience with the sector. We also rely, where relevant, on historical abatement levels and generally double those levels in the downside case. In certain cases, we increase or decrease the downside stress described above to reflect that our base-case assumptions may be subject to more or less variability. (For example, a project required to maintain aging infrastructure that has been subject to a superficial condition survey warrants a higher life cycle stress.) Similarly, we adjust our energy usage and price stress for projects with larger-than-average mechanical and electrical systems given that the aging of those systems will reduce energy efficiency. (For example, this applies to long tunnels that typically have high energy requirements from ventilation systems compared with open-air roads or air controllers.) Asset life assumptions for refinancing risk and future value Concession terms or permit agreements typically determine a transportation asset's life. However, it might also be estimated based on discussions with independent experts, our expectations of demand levels in outer years, and guidance for similar asset types. Construction Phase SACP--Business Assessment Construction difficulty The key challenges in building a transportation project are design considerations (that contemplate ground conditions), required approvals, and licensing and construction techniques. Technologies used for these assets have not materially changed over the years, and, as such, we believe that they typically have limited exposure to technology risk. Chart 6 Construction techniques may affect our construction difficulty assessments. For example, two identical bridge projects could receive different complexity assessments if one project uses well-known and understood techniques and the other uses new processes that could significantly reduce the construction phase's length but are riskier given their lack of a track record. We are likely to assess the first project as a civil or heavy engineering task and the second as a heavy engineering to industrial task. For most roads with few bridges or underpasses, we assess the construction difficulty as either a moderately complex building or simple civil engineering task or a civil or heavy engineering task. We differentiate between these assessments based on several factors, such as topography (the flatter the ground, the easier to build), location (rural locations are easier to build on than urban ones), and site congestion (the presence of existing operations). We typically start our assessment for tunnels, bridges, port, subways, and railways at a heavy engineering to industrial task, and we move up or down one category based on the factors mentioned above. Projects that we assess as a civil or heavy engineering task include tunnels that are being duplicated (the site/ground condition will be known due to the presence of an existing tunnel) and short-span/low-height bridges in sheltered locations. At the other end of the scale, we are likely to assess long tunnels under residential areas/deep water (and the associated risks of collapse) or long-spanning bridges built in demanding weather or site conditions as an industrial task complex building task. Subways are also typically an industrial task complex building task considering the complexity of the underground construction and heavy tunneling activities. Assessments of simple or complex building tasks are rare for road projects unless the road is on relatively flat terrain with simple bridges and underpasses, such as simply supported structures over a single or dual carriageway, and ground condition risks are considerably lower than other projects (either because the project does not bear the risk or available data is comprehensive). This assessment is more frequent for airport projects whose main tasks include the construction of the passenger terminal building and the runway, which are of low complexity. Design is usually not a significant risk in transportation projects since current technologies have been used for at least 15 years and significant data on performance is available. However, we could negatively adjust the assessment for: Projects that need a specific design since cost deviations can be material if the original design changes, or Projects that need extensive technological components, such as electronic tolling systems that rely solely on license plate recognition or dynamic toll rates. Finally, certain risks, such as facing archaeological findings or native title claims, can have a massive effect on the construction process. As a result, we might adjust the construction difficulty assessment to reflect the existence of additional risks. Construction Phase SACP--Financial Assessment Construction base case Most transportation projects globally use EPC contracts to mitigate construction costs and delay risk. Furthermore, risks that are not transferred to the project, such as force majeure risk or delays in achieving planning permission, are in many cases retained by the public-sector concession grantor. If not, we factor the costs of these risks in the base case. Commodities and natural resources projects include the following six asset groups: Conversion or separation of hydrocarbons into value-added energy products: LNG, refining, plastics, or fertilizers (hydrocarbon processing); Pipelines: transmission systems or integrated transmission and distributions systems that transport gas and liquid commodities across regions to link supply with demand; Storage: storing commodities such as liquid fuels, crude oil, or natural gas; Vessels: tankers, FPSO (floating production storage and offloading) or drill ships, typically chartered to offtakers and used in the production or transport of commodities; Mining and extraction: open-cut or underground mines such as iron ore or coal mines or oil and gas extraction and production (E&P;) projects; and Water: desalination plants, privatized water utilities. In some markets, projects such as pipelines and storage facilities are financed on a fully contracted or availability basis and, therefore, are not necessarily exposed to the relevant commodity during the contracted or availability period. However, some of these transactions may be fully contracted at financial close but for a period that is shorter than the debt term, introducing risk to commodity prices and availability at contract maturity. We consider these contracted and uncontracted periods different phases and apply the criteria outlined here to the uncontracted period. During the contracted phase, we consider prices and volumes specified in the terms and conditions of their contractual obligations. ESG considerations.When considering how ESG factors affect the construction or operations of commodities and natural resource projects, we recognize that the environmental and social aspects may be heightened owing to: The need to extract, procure, or process raw materials; The need to deal with byproducts or emissions from the process; and The large land requirements that can have an impact on local communities. Operations Phase SACP--Business Assessment Performance risk Asset class operational stability (ACOS).Given their typical size, use, and operating complexity, the projects in this sector are not assessed at the lower end of the ACOS scale (see chart 7). Chart 7 Resource risk.Resource risk is an important consideration for the performance of commodities and natural resources projects. We look at how the supply dynamics factor into a project's performance by assessing the availability of supply of any required commodity as an input. For example, to assess when natural gas--a typical resource in commodity projects--would be available when needed, we review the contractual arrangement for procuring gas and the infrastructure in place to transport it to the facility. The resource risk assessments for gas projects typically are: Low risk: Projects with redundant connections to highly reliable and diverse natural gas resources with low risk, such as LNG projects in the U.S. Gulf Coast and in Qatar or gas E&P; projects in Israel. Medium risk: Projects reliant upon a single resource without a long production track record and limited transportation infrastructure--for example, LNG projects in Canada or Australia. High and very high risk: Projects where the quality and quantity of the resource available over the debt term are not highly certain; are exposed to supply disruption because of social or political risks, such as in some emerging economies; or are in remote locations. The resource analysis for projects that use oil as an input is like the analysis of those that rely on natural gas. Gas markets are more regional than the global oil market, and the nature of supply contracts could differ significantly. However, the resource analysis for oil projects is similar to that of gas as we assess certainty of supply. This analysis takes into consideration, for example, whether the oil is supplied over land via pipelines or is seaborne and whether a project can use different grades of oil to reduce reliance on specific markets. To assess the resource risk of mining, and oil and gas E&P; transactions, we typically only use the proven level of reserves to determine how much of the resource is available, taking into consideration the operating history of the mine or reserve and the extraction difficulty level. We work with the independent engineer (IE) to understand the potential variability around proven reserve levels. For water desalination, the resource risk is typically low or not applicable given the water is pumped from the sea. Resource risk for commodity storage assets is typically low. Although products for storage could get interrupted enroute to the storage facility, this risk is generally borne by the counterparties, not by the storage asset. Availability payment projects (for example, pipelines with ship or pay contracts) that are not responsible for the resource are assessed as low or not applicable. A resource assessment of low or not applicable can result in the ACOS being unchanged, and a resource assessment of very high can increase the ACOS assessment by four or more notches. Market risk Market risk differs widely among the commodity and natural resource asset types. The main factors affecting the assessment include supply and demand for a particular product, the marginal cost of production, strategic importance, geopolitical pressures, and location. Market exposure.Projects in this sector typically have high market exposure given that prices for many commodities and natural resources are prone to volatility and the debt tenor is often longer than the market contract (see table 24). Table 24 Market Exposure Assessment: Commodities And Natural Resources Projects PROJECTED DECLINE IN CFADS FROM BASE CASE TO MARKET EXPOSURE CASE (%) ASSESSMENT EXAMPLES <5 Not applicable Tolling LNG projects, projects with cash flows backed by contracted offtake, availability-based revenue (for example, desalination plants), pipelines where contracts run for at least the term of the debt (no re-contracting risk), vessels with no re-chartering risk 5-15 Low Partially contracted or hedged market exposure, products with very limited likelihood of product substitution such as specialized inputs (for example, specific grades of oil) to end product manufacturing or use in power generation 15-30 Medium Unhedged full market exposure to commodity prices but product is essential to a specific use and additional competitive capacity has reasonably high barrier to entry (for example, fertilizers or projects with re-contracting risk such as pipelines with a merchant tail) 30-50 High Unhedged full market exposure to commodity prices with history of volatility such as oil or gas (for example, hydrocarbon processing projects where offtake may be volume, but not price), mining and oil and gas exploration and production projects, projects that face re-contracting for a volatile commodity >50 Very high Unhedged full exposure to highly volatile commodity prices, commodities with uncertain future acceptance or substitution risk, such as coal Note: Base case and market exposure case are defined in section 4 of the criteria. CFADS--Cash flow available for debt service. LNG--Liquefied natural gas. Competitive position.We look at several analytical factors in aggregate to determine the competitive position assessment for commodities and natural resources projects (see tables 25-30). For projects with availability-based revenue or fully contracted commodity projects, competitive position typically is neutral. However, we may assess it differently if we expect the competitive factors described in tables 25-30 may hurt the creditworthiness of the project. Table 25 Competitive Position Assessment: Hydrocarbon Processing Projects COMPETITIVE FACTOR MAIN CHARACTERISTICS ANALYZED EXAMPLE IMPACT Feedstock cost What factors affect input costs? Project with top quartile supply costs (lowest costs), owing to dedicated low-cost supply, proximity to supplier, or advantageous contracts Positive Production efficiency What are the project's operating costs compared with peers? Top quartile: Beneficial operations and maintenance contracts, regulatory support, for example through cost recovery mechanism or scale or complexity that is very difficult or expensive to duplicate Positive Bottom quartile: Older assets, projects with lack of scale Negative Geographic position Does the project have a unique location that provides advantages over peers? Superior location may be due to physical constraints, such as proximity to demand centers or advantageous permitting regime Positive Table 26 Competitive Position Assessment: Pipeline Projects COMPETITIVE FACTOR MAIN CHARACTERISTICS ANALYZED EXAMPLE IMPACT Customer mix What is the project's mix, credit quality, and business profile of shippers? Utilities, government-owned oil and gas companies, and local distribution companies primarily concerned with supply security that are able to pass costs to their customer base and are therefore more likely to recontract Positive Value proposition What are the supply/demand characteristics of the market? Supply pulls pipelines in an oversupplied market with weak basis differentials Negative Scale, scope, and diversity What is the scale of the project and diversity of its target markets? Pipeline with multiple receipt and drop-off points covering three or more markets or international cross-border projects where permitting creates barriers to entry Positive Value-add offerings Does the project offer diverse products? Project has connectivity to major trading hubs and storage, improving optionality and value to customers Positive Table 27 Competitive Position Assessment: Storage Projects COMPETITIVE FACTOR MAIN CHARACTERISTICS ANALYZED EXAMPLE IMPACT Customer mix Do the project's customers have long-term needs for the product being stored or traders who are less likely to renew in a down market? Largely contracted cash flows with traders or other parties unlikely to renew contracts, or weak terms give users the ability to walk away Negative Value proposition Does the project offer diverse products? Strong logistical value or volatility dynamic--for example, a crude storage facility used to aggregate and blend to various specifications, or to break down and blend large shipments into more easily marketable lots Positive Scale, scope, and diversity Can the project withstand market changes given its size or diversity of markets served? Small scale assets, assets subject to localized market risk and competition Negative Demand outlook How are project cash flows protected against future drops in demand? A demonstrated track record of demand--for example, a material waitlist for capacity or history of contract renewals Positive Table 28 Competitive Position Assessment: Vessel Projects COMPETITIVE FACTOR MAIN CHARACTERISTICS ANALYZED EXAMPLE IMPACT Customer mix What is the project's mix, credit quality, and business profile of shippers? Highly rated customers with long-term underlying needs and the project has a successful record of being chartered, such as large oil and gas companies with long-term logistics or development needs Positive Operating efficiency What affects the vessel's cost profile versus peers? Assets with fourth quartile operating costs--typically older vessels (10+ years) that face obsolescence as standards evolve Negative Demand outlook Is the fleet of competitive vessels expected to grow? An aging fleet with limited orders and demand expected to outstrip delivery of new vessels Positive Table 29 Competitive Position Assessment: Mining And Extraction Projects COMPETITIVE FACTOR MAIN CHARACTERISTICS ANALYZED EXAMPLE IMPACT Value proposition What is the project's marginal cost of production and ability to withstand low prices? Top quartile cost of production due to dedicated transportation access or specialized product with limited substitution, which can materially mitigate price volatility Positive Regulatory risk Do environmental factors or regulatory aspects affect performance or CFADS? Low risk of adverse regulatory actions due to record of positive operating performance or supportive regulatory regime Positive Demand outlook How are project cash flows protected against future drops in demand? Significant volatility in demand, perhaps due to competition or physical factors such as climate change, where the project cannot quickly adjust output to meet price changes Negative CFADS--Cash flow available for debt service. Table 30 Competitive Position Assessment: Water And Desalination Projects COMPETITIVE FACTOR MAIN CHARACTERISTICS ANALYZED EXAMPLE IMPACT Value proposition Is the plant location advantageous regarding water and power supply? Geographically isolated location, utility contracts are subject to cost variability Negative Operating efficiency How does the project's production costs compare with peers? Costs and power consumption compare favorably with other desalination and other water sources Positive Demand outlook What factors affect future demand for water? Future demand for water likely to be high because of long-term factors such as limited competing water sources, or industrial or population growth Positive Operations Phase SACP--Financial Assessment Table 31 Base, Market Exposure, And Downside Cases Assumptions: Refining And Hydrocarbon Processing Projects BASE CASE MARKET EXPOSURE CASE DOWNSIDE CASE --PRICING AND VOLUMES-- Our base-case pricing typically incorporates oil and gas futures pricing in relevant markets over the next one to two years, and midcycle spreads thereafter, taking into account unique circumstances and input from the market consultant. We take the lowest sustained market price over the past economic cycle for the relevant commodity, considering any structural changes to the market that may mean historical prices are less relevant. This may not be the most recent cycle if we believe the cycle was driven by factors that are unlikely to be repeated. Same as market exposure assumptions REFINING: Our economic starting point for refiners is a midcycle crack spread based on our long-term published crude oil prices, midcycle differentials between heavy and light crude oil grades, and operating expenses reflective of peers. Compressed crack spreads indicate our expectation of trough conditions in market supply and demand fundamentals. Weaker demand is typically affected by seasonality, and supply is hurt by refiners seeking stronger margins, which can lead to oversupply of products, such as gasoline or distillates. At the asset-specific level, we also assume compressed crude discounts. Basis differentials (the price differential of a commodity due to its location--for example, Brent-WTI or WCS-Maya) reflect only the marginal cost of transportation, and quality differentials (the price differential of a commodity due to its quality--for example, light-heavy or sweet-sour) drop to trough levels. Same as market exposure assumptions LNG/PROCESSING: For natural gas processors, we assume an average natural gas liquids (NGL)-to-crude ratio reflecting our long-term NGL crude price deck assumptions. For LNG projects with market pricing, we use our long-term crude and Henry Hub price deck, or other international indices that are relevant for each region. Assumptions can vary, particularly for projects outside of the U.S. that face different commodity pricing and contractual structures. We assume depressed crude oil and natural gas pricing that reflects marginal production costs for LNG price indexation. We forecast NGLs at trough pricing relative to crude owing to marginal production costs and weak NGL correlation. For projects with volume exposure, we assume a decline from base-case volumes if we expect they'll be affected by poor production economics, such as a less competitive facility. Same as market exposure assumptions --PLANT AVAILABILITY AND EXPENSES-- Typically, availability of 90% of management's budgeted forecast capacity for refining projects. Availability of 95% of forecast capacity for LNG and other processing projects. Not applicable Availability reduction of 5% from the base case. Operating expenses based on our expectations adjusted by historical performance and input from technical adviser. Not applicable Operating expenses: +10% per year from the base case. Note: Crack spread is the difference between oil prices and the prices of the refined products made from that oil. Table 32 Base, Market Exposure, And Downside Cases Assumptions: Pipeline, Storage, And Vessel Projects BASE CASE MARKET EXPOSURE CASE DOWNSIDE CASE --PRICING AND VOLUMES-- If re-contracting risk or uncontracted assets are present, we typically use market rates for these uncontracted cash flows. However, we may assume lower rates based on our view of market conditions and relative competitiveness of a particular project. For example, for assets with particularly high volatility, like natural gas storage or very large crude carrier assets, we generally assume rates revert to the historical average, which could be significantly lower than the existing rate. For fully contracted transactions, we follow terms and conditions in the documentation. For some vessels, we may also assume a decline in rates due to a vessel's age, increased competition from newer vessels, or new regulations. If the asset is operating in a new market, we might leverage from markets with similar dynamics or independent consultants. Pipeline: We typically assume no revenue from uncontracted spot volumes during the shipper contract period. We assume expiring shipper contracts renew at below-market rates depending on the pipeline's competitive position assessment and the tightest sustained basis spreads observed over the last economic cycle in the relevant market. For re-contracting of pipelines, we typically lower renewal rates by 15% from initial contracted rates if competitive position is strong. We typically lower rates by 40% if competitive position is neutral and by 60% if competitive position is weak. Same as market exposure assumptions Storage: We typically assume no ancillary or hub service revenues other than cost pass-throughs for services like heating, and a base level of injections/withdrawals. In some markets, we include ancillary revenues with a haircut. After storage contracts expire, we assume re-contracting occurs at lower prices. For gas storage projects in the U.S., we assume pricing is based only on the value generated by seasonal rather than short-term price fluctuations. For liquid storage projects, we generally lower re-contracting rates by 20% if competitive position is strong, by 50% if it is neutral, and by 80% if it is weak. Vessels: After drillship charter contracts expire, we assume they recontract on long-term or spot charter, at rates equivalent to the global trough from the last economic cycle. We also consider our view of the most likely market exposure conditions, given any structural changes that may have occurred or could affect the sector. Where we have limited historical data or have recently witnessed an important structural shift, or in our view are anticipated to witness one in the future, we review charter contract pricing as well as merchant pricing prevalent for that asset. We consider our experience and the market in which it operates to derive assumptions on appropriate stress in consultation with independent experts.

--PROJECT AVAILABILITY AND EXPENSES-- 95% of forecast capacity for floating production storage offloading (FPSO) and floating storage and regasification unit (FSRU) projects. Major maintenance stoppage--based on the independent engineer's review of the likely frequency of stoppages (typically based on the characteristics of the operating field and type of vessel) and cost estimate. Not applicable Availability reduction of 5% from the base case. Operating expenses based on our forecasts and adjusted by historical performance and input from technical adviser. Not applicable Operating expenses: +10% per year from the base case for the first two-thirds of an asset's life and +20% per year thereafter. Table 33 Base, Market Exposure, And Downside Cases Assumptions: Mining And Extraction Projects BASE CASE MARKET EXPOSURE CASE DOWNSIDE CASE --PRICING AND VOLUMES-- The starting point is our published price deck for the commodity for year one and year two, and midcycle prices thereafter. This is likely to vary, depending on factors such as marginal cost of production, likelihood of product substitution, regulations, and cost of transport. For commodities that do not have current published prices, we work with independent consultants to develop a long-term price curve. We look at the lowest sustained market price over a representative economic cycle for the relevant commodity considering any structural changes to the market that may mean historical prices are less relevant (e.g., coal). For contracted capacity, we assume the volume and price at the minimum guaranteed until maturity, and with no re-contracting. Same as market exposure assumptions --PROJECT AVAILABILITY AND EXPENSES-- We consider proven reserves, as assessed by an independent engineer (IE), and the operating performance of the project. We generally do not consider the probable reserves--though we might if we think there is little risk associated with developing reserves (for instance, mining-type oil sands operations, which are akin to strip mining operations where the reserves are close to the surface). In those cases, there is little geological risk associated with converting proved undeveloped reserves and probable reserves into proved reserves. Operating expenses are based on the IE's review, performance history if available, and expectations. Not applicable Operating expenses, including abandonment requirements: typically +10% per year from the base case, which can vary depending on the complexity of operations and maintenance and asset aging. Table 34 Base, Market Exposure, And Downside Cases Assumptions: Water And Desalination Projects BASE CASE MARKET EXPOSURE CASE DOWNSIDE CASE --PRICING AND VOLUMES-- These are often based on fixed offtake prices or availability-based tariffs. Volumes are typically based on historical averages and an independent engineer's assessment if projects face dispatch risk. We also contemplate whether the risk of water quality inflow is addressed in the concession or offtake agreement and whether producers are protected via force majeure provisions. Protections such as deemed capacity payments would apply should water inflow fall outside of contractual specifications. In the absence of such protections or other mitigants, our base-case assumptions consider any potential unavailability due to uncovered events that might affect volumes. Market exposure is likely limited because of contracted prices and availability-based offtake. In case of a mismatch between the variable component of the water tariff and the variable operational and maintenance cost, various dispatch levels should be tested to arrive at the lowest CFADS. We could use historical dispatch levels if they are available. Same as market exposure assumptions. --PROJECT AVAILABILITY AND EXPENSES-- Availability is based on technology operating track record and views of technical adviser, if appropriate. Expenses are based on historical record or operations and maintenance (O&M;) contract if applicable. Not applicable Availability: We consider a 3% decrease from base-case assumption for reverse osmosis plant, a 6% decrease from base-case assumption for thermal desalination plant. For other type of water assets, assumption is assessed in consultation with independent engineer. Maintenance expenses are typically at least 10% per year from the base case, depending on the O&M; expected performance. --PLANT POWER CONSUMPTION-- Based on technology operating track record and views of technical advisor, if appropriate. Not applicable Required power consumption is typically +3% from the base case. Asset life assumptions for refinancing risk and future value Table 35 specifies the typical asset life assumption for commodities and natural resources projects. Table 35 Typical Asset Life: Commodities And Natural Resources Projects ASSET TYPE TYPICAL ASSET LIFE Refinery 22 years, although significant major maintenance can extend life Gas processing 30 years LNG facility 30 years, equipment useful life generally ranges from 10-50 years Pipelines 30 years Storage 30 years Crude tankers 20 years LNG tankers 25 years Drill ships (including FPSO/FSRU) 25-30 years

Desalination Up to 35 years for reverse osmosis plants and up to 25 years for thermal desalination plants, although refurbishments could extend the asset life LNG--Liquefied natural gas. FPSO--Floating production storage offloading. FSRU--Floating storage and regasification unit. Construction Phase SACP--Business Assessment Construction difficulty Natural resources and commodities projects typically have construction difficulty assessments of 4 or 5, though some asset classes could be assessed lower (see chart 8). These projects often take a long time to develop and construct and are complex integrated systems that are expected to withstand extreme conditions (including pressures, temperatures, and chemistry) while achieving high throughput or availability rates. Chart 8 Project-specific adjustments Commodities and natural resources projects are generally custom-built, so we evaluate technology and design choices in the context of operating configuration, scale, and environment. The evaluation considers the track record of the technology and design in similar applications and environments as well as the suitability of the solutions for each specific project. Permitting is also a key risk factor because most commodities and natural resources projects are exposed to environmental issues, such as extraction and transportation of potentially toxic or flammable inputs and the need to deal with emissions or waste. Given the variety of commodity project types, the impact of specific adjustments will vary, though we expect to mostly assess them as neutral given the widespread use of proven processes. Technology used.Most projects use proven technologies, which have existed in many of these industries for at least 20 years. These generally ensure construction performance forecasts are accurate and contractual requirements are met. Examples include refineries, gas processors, LNG export and import facilities, natural gas and crude oil pipelines, tank storage, and crude oil tankers. To the extent that the technology is not commercially proven--as the project uses it--or has been successfully deployed in service but has not yet operated through a life cycle, we make a negative adjustment. This would be the case, for example, for a pet-coke gasifier using new generation technology that has yet to demonstrate operating performance consistent with design standards through its life cycle in multiple facilities. Design complexity.Factors that can affect commodities and natural resources projects' design complexity, and the construction difficulty assessment, include: Soil and ground conditions: Soil and ground with poor structural properties, such as swamps or marshes, may require more complex foundation designs. Environmental conditions: Contamination, endangered species, emission limits, and unexpected archaeological finds could delay construction and increase construction costs. Water availability: Many commodities projects use water extensively in processes, and an inadequate assessment of the water supply could result in lower production capacity or more project downtime. Site access: Very confined sites without room for onsite material storage, remote locations, and poor road access can negatively affect construction progress and limit a contractor's ability to recover from unexpected delays. Construction adjacent to sensitive areas or residential areas may also limit working times and practices. Utilities: Sites that require many utility services could face increased risk in meeting deadlines owing to performance of third-party utilities. The conversion of existing facilities to a new use can lead to more uncertain construction costs because the condition, performance, and integrity of the existing facilities may be uncertain. Construction Phase SACP--Financial Assessment Construction base case Most natural resources and commodities projects use EPC contracts to mitigate construction cost and delay risk. This exposure may be more pronounced as limited competition or patented processes may mean a small pool of replacement contractors or technology providers, for example in large scale LNG plants. However, the project may retain some exposure to force majeure risk, delays in receiving permits, change orders, or additional parts of the overall construction scope to manage--the costs of which are factored into the base case. CHANGES FROM PREVIOUS CRITERIA For a summary of the changes made relative to the previous criteria, see "General Project Finance Rating Methodology." IMPACT ON OUTSTANDING RATINGS "General Project Finance Rating Methodology" outlines the impact of the criteria on outstanding ratings. RELATED PUBLICATIONS Fully superseded criteria Key Credit Factors For Road, Bridge, And Tunnel Project Financings, Sept. 16, 2014 Key Credit Factors For Social Infrastructure, Accommodation, And Entertainment Project Financings, Sept. 16, 2014 Key Credit Factors For Oil And Gas Project Financings, Sept. 16, 2014 Key Credit Factors For Power Project Financings, Sept. 16, 2014 Related criteria General Project Finance Rating Methodology, Dec. 14, 2022 Principles Of Credit Ratings, Feb. 16, 2011 Stand-Alone Credit Profiles: One Component Of A

Rating, Oct. 1, 2010 Related sector and industry variables report Sector And Industry Variables: Project Finance Rating Methodology, Dec. 14, 2022 Related research Evolution Of The Methodologies Framework: Introducing Sector And Industry Variables Reports, Oct. 1, 2021