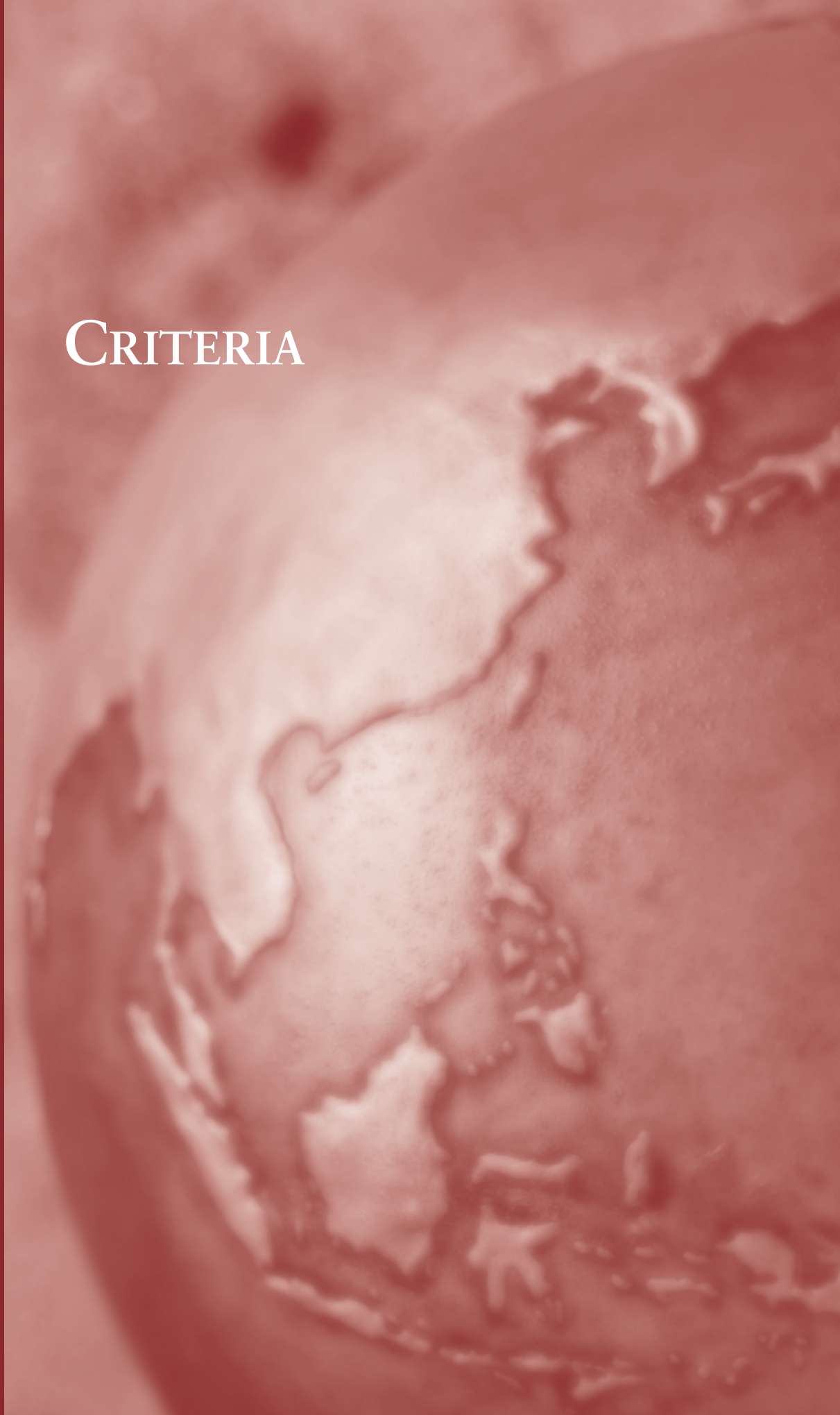
Criteria



Project Finance Summary Debt Rating Criteria

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As project finance has adjusted to the increasingly diverse needs of project sponsors and their lenders, the analysis of risk has become more complicated. Moreover, despite claims in some quarters that project finance is dead, global lending has been exceeding $100 billion per year. The variety of project finance applications and locations indicates that perhaps project finance is, instead, entering a new era. Contract-based revenues are increasingly rare. Fewer projects are able to secure the highly desirable fixed-price, turnkey, date-certain construction contracts that protect lenders from construction and completion risk. Commodity price and market risk now dominate much of the analysis of project finance. Innovative risk transfer vehicles, such as contingent capital and limited sponsor recourse, are making inroads into new financings. Transactions span such industries as meatpacking, power generation, oil and gas, entertainment, transport and military housing, to name a few. For lenders and other investors, identifying, comparing, and contrasting project risk systematically can indeed be a daunting task.

To address the challenge in analyzing project finance risk, Standard & Poor's uses a framework of analysis that extends well beyond its traditional approach that grew out of rating U.S. independent power projects. The approach begins with the assumption that a project is a collection of contracts and agreements among various parties, including lenders, that collectively serves two primary functions: The first is to create a company that will act on behalf of its sponsors to bring together several unique factors of production to produce a single product or service.

The second function is to provide lenders with the security of payment of interest and principal from a single operating entity. Standard & Poor's analytic framework then focuses primarily on determining how competitive the project will be in its market segment and which risks might undermine its competitiveness and hence, the assurance of repayment to lenders.

Project Finance Defined

Standard & Poor's defines a project company as a group of agreements and contracts between lenders, project sponsors, and other interested parties that creates a form of business organization that will issue a finite amount of debt on inception; will operate in a focused line of business; and will ask that lenders look only to a specific asset to generate cash flow as the sole source of principal and interest payments and collateral.

What the rating means. Standard & Poor's project ratings address default probability, or put differently, the level of certainty with which lenders can expect to receive timely payment of principal and interest according to the terms of the bond or note. Project ratings do not distinguish between the debt issue rating and the issuer credit rating, as is the case with corporate credit ratings, for a number of reasons. First, project documentation generally allows a project to issue debt at its inception to operate with a single business focus and typically to maintain a constant risk profile. Second, project debt does not become a permanent part of the capital structure, but rather amortizes in most projects according to a schedule based on the project's useful life. Finally, projects do not by design build up equity, but instead, use up cash quickly, first as operating expenses, then as debt service (often the most significant expense), and finally as dividends. *(For a more comprehensive discussion of project finance risk and for clarification of specific topics, see Standard & Poor's "Debt Rating Criteria for Energy, Industrial, and Infrastructure Project Finance," March 19, 2001).*

Framework for Project Finance Criteria

This article summarizes an analytic framework that can be used to systematically assess cash flows based on project-level risks and then to analyze risks external to the project. External risks, many of which are often country specific, include lack of host country institutional development needed to support the project, *force majeure*, and sovereign risk.

Five levels of analysis form Standard & Poor's framework of project analysis:

- Project-level risks,
- Sovereign risk,
- Business and legal institutional development,
- Force majeure risk, and
- Credit enhancements.

The analysis begins with identifying and assessing project-level risks. These risks generally define most of the risks associated with the choice of business because if a project cannot reasonably forecast commercially ongoing operations, other concerns such as the viability of guarantees or credit enhancements will count for little.

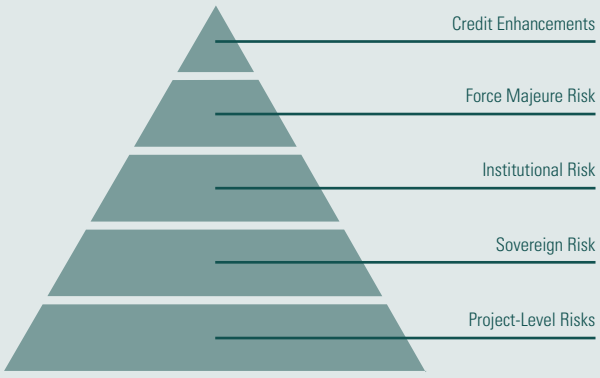
Project-level risk consists of the following categories:

- Contractual foundation;
- Technology, construction, and operations;
- Competitive market exposure;
- Legal structure;
- Counterparty exposure; and
- Financial strength.

A project debt rating involves a marshaling of the various heads of risk, analyzing their respective magnitude and likelihood of occurrence, and assessing the effect thereof on the project to operate and to pay debt service on the rated obligations. Surprisingly, even though project finance is supposed to be nonrecourse to the sponsor, some lender credit assessments are often based on the sponsor's reputation, its creditworthiness, or both—the implication being that the sponsor will support the project in difficult times. Particularly when the sponsor is rated higher than the project, such an approach flies in the face of evidence that sponsors have walked away when the projects became uneconomical. Sponsor reputation and experience are certainly considered in the assessment of project completion and operations. But in the absence of an independent determination that, despite its nonrecourse status, the project is strategically essential to the sponsor, the rating will reflect primarily the project's standalone economic viability.

Chart 1

Framework of Project Analysis



Project-Level Risks

Standard & Poor's analysis of project finance risk begins with the identification and assessment of project-level risks. Standard & Poor's defines these risks as those intrinsic to the project's business and the industry in which it operates (e.g., a merchant power plant selling power to the U.K. electricity sector). The first objective of the analysis is to determine how well a project can sustain ongoing commercial operations throughout the term of the rated debt and, as a consequence, how well the project will be able to service its obligations (financial and operational) on time and in full.

There are six broad steps in assessing project-level risk:

1. Evaluate project operational and financing contracts that, along with the project's physical plant, serve as the basis of the enterprise;
2. Assess the technology, construction, and operations of the enterprise;
3. Analyze the competitive position of the project against the market in which it will operate;
4. Determine the risk that counterparties, such as suppliers and customers, present to the enterprise;
5. Appraise the project's legal structure; and
6. Evaluate the cash flow and financial risks that may affect forecasted results.

Contractual foundation. The primary objective of analyzing project contracts is to determine the level of protection from market and operating conditions each agreement provides. The secondary objective is to determine whether the obligations created by each contract address the project's operating risk characteristics and mesh correctly with other project contracts.

The project structure should protect stakeholders' interests through contracts that encourage the parties to complete project construction satisfactorily and to operate it competently. The project's structure should also give stakeholders a right to a portion of the project's cash flow to service debt and, in appropriate circumstances, to release free cash to the equity in the form of dividends. Moreover, higher rated projects generally give lenders the assurance that project management will align their interests with lenders' interests; project management should

Table 1

Contractual Foundation Benchmark Scores

Score	Characteristics
1	Project has a credit lease, hell-or-high-water contract; even if the project is a technological/operational failure, it receives full revenue payments sufficient to cover debt service.
	Indenture creates a first perfected security interest in all project assets, contracts, permits, and accounts necessary to run the project.
	Strict controls on cash flows and distributions.
	Trustee (offshore for cross-border debt).
2	Project has a credit lease, hell-or-high-water contract; even if the project is a technological/operational failure, it receives full revenue payments.
	Indenture creates a first perfected security interest in all project assets, contracts, permits, and accounts necessary to run the project.
	Strict controls on cash flow.
	Trustee (offshore for cross-border debt).
3	Project has excellent long-term concession or other offtake agreement that provides predictable revenues that cover fixed payments and variable costs.
	Virtually no conditions that could reduce revenue payments.
	Revenues are protected from foreign exchange, inflation, and market risks.
	Solid supply contracts; minimal cost/revenue mismatch.
	Business interruption and casualty insurance policies in place.
	No regulatory outs or easy termination provisions.
	Indenture creates a first perfected security interest in all project assets, contracts, permits, and accounts necessary to run the project.
	Strict controls on cash flow.
	Trustee (offshore for cross-border debt).
5	Project has good long-term concession or offtake agreement, but does not fully protect lenders from market, inflation, or foreign exchange risks.
	Project could be a merchant project, but is secured by licenses, permits, sites, and contractual access to markets.
	Contract outs for offtaker or government.
	Adequate supply contracts; potential for cost/revenue mismatch.
	Business interruption and casualty insurance policies in place.
	Indenture creates a first perfected security interest in all project assets, contracts, permits, and accounts necessary to run the project.
	Strict controls on cash flow.
	Trustee (offshore for cross-border debt).
7	Project has fair long-term concession or offtake agreement, but exposes lenders to market, inflation, or foreign exchange risks.
	Contract outs or termination easily achieved.
	No contractual requirements to perform while disputes are being resolved.
	Contracts contain poorly defined provisions and ambiguous requirements.
	No provisions for international arbitration.
	Weak insurance program.
	Indenture provides little security or collateral for lenders.
	Few controls on cash flow.
	No trustee.
10	No contracts support revenue or supply.
	No contractual requirements to perform while disputes are being resolved.
	Contracts contain poorly defined provisions and ambiguous requirements.
	No provisions for international arbitration.
	Little or no insurance.
	Indenture provides virtually no security for project.
	Virtually no controls on cash flow.
	No trustee.

Table 2

Technology, Construction, and Operations Benchmark Scores

Score	Characteristics
1	Project is a credit lease, hell-or-high-water contract; even if the project is a technological/operational failure, it receives full revenue payments.
2	Project has fixed-price, date-certain, turnkey contract; one-year-plus guarantees; superior liquidated performance/delay damages; highly rated by Standard & Poor's; EPC contractor, credible sponsor completion guarantee, or LOC-backed construction; installed costs at or below market; contracts executed. Independent engineer (IE) oversight through completion, including completion certificate. Commercially proven technology used. Rated O&M contract with performance damages. Budget and schedule are credible, not aggressive. Thorough and credible IE report.
3	Project has fixed-price, date-certain, turnkey contract; one-year guarantees for adequate liquidated performance/delay damages; reputable EPC contractor or LOC-backed construction; installed costs at market rate; mostly permitted and well-sited. IE oversight through completion. Commercially proven technology used. O&M contract with performance damages. Budget and schedule are credible, possibly aggressive. Thorough IE report, but missing key conclusions.
5	Project has fxed-price, date-certain, turnkey contract; less than one-year guarantees; some liquidated performance/delay damages; known EPC contractor or surety bond-backed construction; installed costs at premium rate; many permits and well-sited; possible local political/regulatory problems. Limited IE oversight. Commercially proven technology used. O&M contract with performance damages. Budget and schedule are credible, possibly aggressive. Mostly complete IE report; conclusions are weak.
7	Project has partial fixed-price, date-certain, turnkey contract and cost-plus features; weak guarantees, if any; minor liquidated performance/delay damages; questionable EPC contractor or weak performance bond-backed construction; installed costs at premium rate or not credible; permits lacking and siting issues; possible local political/regulatory problems. No IE oversight. Technology issues exist. Aggressive budget and schedule. IE report leaves many issues open.
10	Project has cost-plus contracts, no cap; weak guarantees, if any; minor liquidated performance/delay damages; questionable EPC contractor. Costly budget. Permits lacking; siting issues exist. Possible local political/regulatory problems. No IE oversight. No IE report. Technology issues exist. Aggressive budget and schedule.

have limited discretion in changing the project's business or financing activities. Finally, the stronger projects distinguish themselves by agreeing to give lenders a first perfected security interest (or fixed charge, depending on the legal jurisdiction) in all of the project's assets, contracts, permits, licenses, accounts, and other collateral so the project can be disposed of in its entirety, should the need arise.

A project's contract analysis focuses on the terms and conditions of each agreement. The analysis also considers the adequacy and strength of each contract in the context of a project's technology, counterparty credit risk, and the market, among other project characteristics. Project contract analysis falls into two broad categories: commercial agreements and collateral arrangements. Examples of key commercial project agreements and contracts include the following:

- Power purchase agreements,
- Gas and coal supply contracts,
- Steam sales agreements,
- Concession agreements,
- Airport landing-fee agreements, and
- BOOT (build-own-operate-transfer) contracts.

Collateral agreements include an analysis of the following:

- Project completion guarantees;
- Assignments to lenders of project assets, accounts, and contracts;
- Credit facilities or lending agreement;
- Equity contribution agreement;
- Indenture;
- Mortgage, deed of trust, or similar instrument that grants lenders a first-mortgage lien on real estate and plant;
- Security agreement or similar instrument that grants lenders a first mortgage lien on various types of personal property;
- Depositary agreements;
- Collateral and intercreditor agreements; and
- Liquidity support agreements, such as letters of credit (LOCs), surety bonds, and targeted insurance policies.

Technology, construction, and operations. The dependability of a project's design, construction, and operation are critical to the project rating; if a project fails to achieve completion or to perform as designed, many contractual and other legal remedies may fail to keep lenders economically whole.

The technical assessment of project risk falls into two categories: preconstruction and postconstruction. Preconstruction risk consists of:

- Engineering and design,
- Site plans and permits,
- Construction, and
- Testing and commissioning.

Postconstruction risk is made up of:

- Operations and maintenance (O&M), and
- Historical operating record, if any.

Project lenders frequently rely on the reputation of the engineering, procurement, and construction (EPC) contractor or the project sponsor as a proxy for technical risk, particularly when lending to unrated transactions. The record suggests that such confidence may be misplaced. Standard & Poor's experience with technology, construction, and operations risk on more than 150 project finance ratings indicates that technical risk is pervasive during the pre- and postconstruction phases, while the possibility of sponsors coming to the aid of a troubled project is uncertain. Moreover, many lenders do not adequately evaluate the risk when making investment decisions. Thus, Standard & Poor's places considerable importance on the technical evaluation of project-financed transactions.

Standard & Poor's conducts its technical assessment in several ways, including a review of the independent engineer's (IE) project evaluation. This review assesses whether the scope and depth of the engineer's investigation support the sponsor's and EPC contractor's conclusions. Standard & Poor's supplements its review of the independent expert's report with meetings with the authors and visits to the site to inspect the project and hold discussions with the project's management and EPC contractor. Without an IE review, Standard & Poor's will most likely assign a speculative-grade debt rating, regardless of whether the project is in the pre- or postconstruction phase.

Competitive market exposure. A project's competitive position within its peer group is a principal credit determinant. Analysis of the competitive market position focuses on the following factors:

- Industry fundamentals,
- Commodity price risk,
- Supply and cost risk,
- Outlook for demand,
- Foreign exchange exposure,
- The project's source of competitive advantage, and
- Potential for new entrants or disruptive technologies.

Given that most projects produce a commodity, such as electricity, ore, oil or gas,

Table 3

Competitive Market Risk Benchmark Scores

Score	Characteristics
1	Project is a credit lease, hell-or-high-water contract; even if the project is a technological/operational failure, it receives full revenue payments.
2	Project sells a commodity sold widely on the world market.
	Project is in first cost quartile of producers.
	Solid competitive advantage in location, technology, and know-how.
	Demand is excellent for product/service.
	Long-term market outlook is excellent.
	For non-commodity products/services: project is in first cost quartile of producers and enjoys defensible price premium.
	Revenue and supply contracts will likely keep project economical.
3	Project sells a commodity sold widely in regional markets.
	Project is in first cost quartile of producers.
	Solid competitive advantage in location, technology, and know-how.
	Demand is excellent for product/service.
	For non-commodity products/services: project is in second cost quartile of producers and enjoys defensible price premium.
	Revenue and supply contracts will likely keep project economical.
5	Project sells a commodity widely sold on the market.
	Project is in the second cost quartile of producers.
	Demand for product/service should be adequate through debt.
	Competitive advantage in location, technology, and know-how, but may be hard to defend long term.
	For non-commodity products/services: project is in second cost quartile of producers; does not have a premium product.
	Pricing controlled/influenced by a regulator.
	Project could be uneconomical to primary offtaker.
7	Project sells a commodity, but sold in limited markets.
	Project is in the third cost quartile of producers
	Few competitive advantages.
	For non-commodity projects/services: project is in third cost quartile of producers producers; does not have a premium product.
	Demand for product/service is limited and decreasing.
	Project is out of market or soon will be.
	Project is uneconomical to primary offtaker.
10	Project sells a commodity, but sold only in a few markets.
	Project is one of the most expensive producers.
	Virtually no competitive advantage in any aspect of its business.
	For non-commodity projects: project is in fourth quartile of low-cost producers and does not have a premium product.
	Little demand for product/service.
	Project is uneconomical to any/all parties associated with it.

or some form of transport, low-cost production relative to the market is essential for an investment-grade rating. High costs relative to an average market price, in the absence of mitigating circumstances, will almost always place lenders at risk. But competitive position is only one element of market risk. The demand for a project's output can change over time, sometimes dramatically, resulting in low clearing prices. The reasons for demand change are many and usually hard to predict. Any of the following can make a project more or less competitive:

- New products,
- Changing customer priorities,
- Cheaper substitutes, or
- Technological change.

Experience has shown, however, that offtake contracts providing stable revenues or that limit cost risk, or both, may not be enough to mitigate adverse market situations. Hence, market risk can potentially take on greater importance than the legal profile of, and security underlying, a project. Conversely, if a project provides a strategic input that has few, if any, substitutes, economic incentives will be stronger for the purchaser to maintain a viable relationship with the project.

Legal structure. Standard & Poor's assesses whether the project is chartered solely to engage in the business and activities being rated. It will also determine that the insolvency of entities connected to the project (sponsors, affiliates thereof, suppliers, etc.), which are unrated or are rated lower than the rating sought for the project, should not affect project cash flow. Standard & Poor's also analyzes other structural features to assess their potential to manage cash flow and prevent a change in the project's risk profile. These may include:

- Choice of legal jurisdiction,
- Documentation risk,
- Trustee arrangements, or
- Intercreditor arrangements.

Standard & Poor's generally will not rate a project higher than the lowest rated entity (i.e., the offtaker) that is crucial to project performance, unless the entity may be easily replaced, notwithstanding its insolvency or failure to perform, or unless it is a special purpose entity (SPE). Moreover, the transaction rating may also be constrained by a project sponsor's rating if the project is in a jurisdiction where the sponsor's insolvency may lead to the insolvency of the project, particularly if the sponsor is the sole parent of the project.

A project finance SPE, as defined by Standard & Poor's, is a limited purpose operating entity whose business purposes are limited to:

- Owning the project assets,
- Entering into the project documents (e.g., construction, operating, supply, input and output contracts, etc.),
- Entering into the financing documents (e.g., the bonds; indenture; deeds of mortgage; and security, guarantee, intercreditor, common terms, depositary, and collateral agreements, etc.), and
- Operating the defined project business.

The thrust of this single-purpose restriction is that the rating on the bonds represents, in part, an assessment of the creditworthiness of specific business activities.

One requirement of a project finance SPE is that it is restricted from issuing any subsequent debt rated lower than its existing debt, unless such debt is subordinated in payment and security to the existing debt and does not constitute a claim on the project. A second requirement is that the project should not be permitted to merge or consolidate with any entity rated lower than the rating on the project debt. A third requirement is that the project (as well as the issuer, if different) continue in existence for as long as the rated debt remains outstanding. The final requirement is that the SPE must have an antifiling mechanism in place to hinder an insolvent parent from bringing the project into bankruptcy. In the U.S., this can be achieved by the independent director mechanism whereby the SPE provides in its charter documents that a voluntary bankruptcy filing by the SPE requires the consenting vote of the designated independent member of the board of directors (the board generally owing its fiduciary duty to the equity shareholder[s]). The independent director's fiduciary duty, which is to the lenders, would be to vote against the filing. In other jurisdictions, the same result is achieved by the "golden share" structure, in which the project issues a special class of shares to some independent entity (such as the bond trustee), whose vote is required for a voluntary filing.

The antifiling mechanism is not designed to allow an insolvent project to continue operating when it should otherwise be seeking bankruptcy protection. In certain jurisdictions, antifiling covenants have been held to be enforceable, in which case such a covenant (and an enforceability opinion with no bankruptcy qualification) would suffice. In the U.K. and Australia, where

Table 4

Legal Risk Benchmarks

Score	Characteristics
1	Project is a credit lease, hell-or-high-water contract; even if the project is a technological/operational failure, it receives full revenue payments sufficient to service fixed obligations.
	Project is a bankruptcy-remote SPE.
	Virtually no ability to issue additional debt.
	New York or London financing jurisdiction.
	Adequate legal opinions support project documentation, collateral, and relevant tax matters.
	Documents provide for superior ongoing disclosure and monitoring.
2	Project is a bankruptcy-remote SPE.
	New York or London financing jurisdiction.
	Adequate legal opinions support project documentation, collateral, and relevant tax matters.
	Superior financing documentation.
	Extremely limited ability to issue additional debt.
	Collateral and security strongly enforceable.
	Documents provide for superior ongoing disclosure and monitoring.
3	Project is a bankruptcy-remote SPE.
	New York or London financing jurisdiction.
	Adequate legal opinions support project documentation, collateral, and relevant tax matters.
	Excellent financing documentation.
	Mostly limited ability to issue additional debt.
	Collateral and security strongly enforceable.
	Documents provide for superior ongoing disclosure and monitoring.
5	Project is reasonably bankruptcy-remote and strongly SPE.
	New York or London financing jurisdiction.
	Adequate legal opinions support project documentation, collateral, and relevant tax matters.
	Adequate financing documentation.
	Project can issue additional debt with some controls.
	Collateral and security adequately enforceable.
	Documentation provides for adequate ongoing disclosure and monitoring.
7	Project is neither bankruptcy-remote nor an SPE.
	Financing jurisdiction is questionable.
	Legal opinions weak or unavailable.
	Marginal financing documentation.
	Project can issue unlimited additional debt.
	Collateral and security probably not enforceable.
	Ongoing disclosure and monitoring will probably be difficult.
10	Project is neither bankruptcy-remote nor an SPE.
	Financing jurisdiction is questionable.
	Legal opinions unavailable.
	Weak financing documentation.
	Project can issue unlimited additional debt.
	Questionable enforceability of collateral and security.
	Documentation does not provide for ongoing disclosure or monitoring.

a first "fixed and floating" charge may be granted to the collateral trustee as security for the bonds, the collateral trustee can appoint a receiver to foreclose on and liquidate the collateral without a stay or moratorium, notwithstanding the insolvency of the project debt issuer. In such circumstances, the requirement for an independent director may be waived.

The SPE criteria will apply to the project (and to the issuer if a bifurcated structure is considered) and is designed to ensure that the project remains nonrecourse in both directions: by accepting the bonds, investors agree that they will not look to the credit of the sponsors, but only to project revenues and collateral for reimbursement. Investors, on the other hand, should not be concerned about the credit quality of other entities (whose risk profile was not factored into the rating) affecting project cash flows.

Counterparty exposure. The strength of a project financing rests on the project's ability to generate cash, as well as on its general contractual framework, but much of the project's strength comes from contractual participation of outside parties in the establishment and operation of the project structure. This participation raises questions about the strength and reliability of such participants. The traditional counterparties to projects have included raw material suppliers, principal offtake purchasers, and EPC contractors. Even a sponsor becomes a source of counterparty risk if it provides the equity during construction or after the project has exhausted its debt funding.

Table 5

Counterparty Benchmark Scores

Score	Characteristics
1	Project is a credit lease, hell-or-high-water contract; even if the project is a technological/operational failure, it receives full revenue payments.
	Rated offtake counterparty with exceptional credit rating.
	Counterparty guarantees debt payment.
2	Project is a credit lease, hell-or-high-water contract; even if the project is a technological/operational failure, it receives full revenue payments.
	Rated offtake counterparty with excellent credit rating.
	Counterparty guarantees revenue payments.
3	Supply and offtake contract counterparties have good credit ratings.
	Sponsor counterparty obligations are backed by good ratings or LOCs.
	Government counterparties, if any, have good credit ratings.
	Financial counterparties have good credit ratings.
5	Supply and offtake contract counterparties have adequate credit ratings.
	Sponsor counterparty obligations are backed by adequate ratings or LOCs.
	Government counterparties, if any, have adequate credit ratings.
	Financial counterparties have adequate credit ratings.
7	Supply and offtake contract counterparties have doubtful creditworthiness.
	Sponsor counterparty obligations are uncertain.
	Government counterparties, if any, have adequate credit ratings.
	Financial counterparties have weak credit ratings.
	Service counterparties have weak credit ratings.
10	Supply and offtake contract counterparties have poor creditworthiness.
	Sponsor counterparty obligations are weak.
	Government counterparties, if any, have poor credit ratings.
	Financial counterparties have poor credit ratings.
	Service counterparties have poor credit ratings.

Important offtake counterparties to a project can include:

- Providers of LOCs and surety bonds,
- Parties to interest rate and currency swaps,
- Buyers and sellers of hedging agreements and other derivative products,
- Marketing agents,
- Political risk guarantors, and
- Government entities.

Because projects have taken on increasingly complex structures, a counterparty's failure can put a project's viability at risk.

Financial strength. Projects must withstand numerous financial threats to their ability to generate revenues sufficient to cover O&M expenses, nonrecurring items, capital replacement expenditures, taxes, and annual fixed charges of principal and interest, among other expenses. Projects must contend with such risks as interest rate and foreign currency volatility, inflation risk, liquidity risk, and funding risk. Standard & Poor's considers a project's capital structure a source of financial risk. Too much debt places a project at risk of volatile currencies, interest rates, and market liquidity.

Investment-grade project debt should be amortizing debt. Few projects, particularly power projects, can adequately assume the refinancing risk of the bullet maturities characteristic of corporate or public financings. Unlike a corporate entity, a single-asset power generation facility is more likely to have a finite useful life. Because of this depreciating characteristic, a fixed obligation payable by an aging project near the end of the project's life is necessarily more risky and speculative than an obligation payable from cash sourced in diverse assets.

Standard & Poor's relies on debt-service coverage ratios (DSCRs) as the primary quantitative measure of a project's financial credit strength. The DSCR is the ratio of cash from operations (CFO) to principal and interest obligations. CFO is calculated strictly by taking cash revenues and subtracting expenses and taxes, but excluding interest and principal, needed to maintain ongoing operations. The ratio calculation also excludes any cash balances that a project could draw on to service debt, such as the debt service reserve fund or maintenance reserve fund. To the extent that a project has tax obligations, such as host country income tax, withholding taxes on dividends and interest paid overseas, etc., Standard & Poor's treats these taxes as ongoing expenses needed to keep a project operating *(see also Standard & Poor's "Tax Effects on Debt Service Coverage Ratios," July 27, 2000)*.

Note that projects are increasingly using subordinated debt in their capital structures to help mitigate commodity price risk. Although such structures can be helpful, subordinated debt is just that—inferior to senior lenders' rights to cash flow or collateral until after the project has met senior lenders' obligations. Moreover, in calculating the DSCR, and ultimately the rating, on subordinated debt, Standard & Poor's divides total CFO by the sum of senior debt-service obligations plus the subordinated obligations. Such a formula more accurately measures the subordinated payment risk than using CFO *after* senior debt service obligations and dividing it by subordinated obligations.

Sovereign Risk

As a general rule, project ratings are constrained by the foreign currency rating of the country where the project is located. A sovereign foreign currency rating indicates the sovereign government's willingness and ability to service its foreign currency denominated debt on time and in full. The sovereign foreign currency rating acts as a constraint because the project's ability to acquire the hard currency needed to service its foreign currency debt may be affected by acts or policies of the government. For example, in times of economic or political stress, or both, the government may intervene in the settlement process by impeding commercial conversion or transfer mechanisms, or by implementing exchange controls. In some rare instances, a project rating may exceed the sovereign foreign currency rating if the project has foreign ownership that is key to its operations, if the project can earn hard currency by exporting a commodity with minimal domestic demand, or if other risk-mitigating structures exist.

Institutional Risk

Even though a project's sponsors and its legal and financial advisors may have structured a project to protect against readily foreseeable contingencies, risks from certain country-specific factors may unavoidably place lenders at risk. Specifically, these factors involve the business and legal institutions needed to enable the project to operate as intended. Experience suggests that in some emerging markets, vital business and legal institutions may not exist or may exist only in nascent form. Standard & Poor's sovereign foreign currency ratings do not necessarily measure institutional risk. In some cases,

Table 6

Financial Risk Benchmark Scores

Score	Characteristics
1	Project is a credit lease, hell-or-high-water contract; even if the project is a technological/operational failure, it receives full revenue payments.
	Financial flexibility not needed.
	Amortizing debt payments.
	No subordinated debt allowed.
2	Financial model strongly reflects project documentation.
	Minimum DSCR exceeds 4.0x.
	Average DSCR exceeds 6.0x.
	Project insensitive to interest, inflation, and foreign exchange risks.
	Distress scenario analyses show less than 50 basis point coverage deterioration.
	Excellent financial flexibility protection.
	Amortizing debt payments.
	No subordinated debt allowed.
3	Financial model reflects project documentation.
	Minimum DSCR exceeds 3.0x.
	Average DSCR exceeds 5.0x.
	Project slightly sensitive to interest, inflation, and foreign exchange risks.
	Distress scenario analyses show less than 100 basis point coverage deterioration.
	Good financial flexibility.
	Amortizing debt payments.
	Subordinated debt allowed, but rights against senior debt are unenforceable.
5	Financial model adequately reflects project documentation.
	Minimum DSCR exceeds 1.5x.
	Average DSCRs range from 2.0x to 3.0x.
	Project sensitive to interest, inflation, and foreign exchange risks.
	Distress scenario analyses show less than 80 basis point coverage deterioration.
	Good financial flexibility.
	Mostly amortizing debt, but may have limited bullet payment(s).
	Subordinated debt allowed, but rights against senior debt are limited.
7	Financial model conflicts with project documentation.
	Minimum DSCR exceeds 1.2x.
	Average DSCR ranges from 1.5x to 2.5x.
	Interest, inflation, and/or foreign exchange changes significantly affect DSCRs.
	Distress scenario analyses show less than 80 basis point coverage deterioration.
	Limited financial flexibility.
	Bullet maturities likely.
	Subordinated debt allowed; distress may affect senior debt.
10	Financial model conflicts with project documentation.
	Minimum DSCR exceeds 1.0x.
	Average DSCR exceeds 1.1x to 1.5x.
	Interest, inflation, and/or foreign exchange changes significantly affect DSCRs.
	Distress scenario analyses show less than 50 basis point coverage deterioration.
	No financial flexibility.
	Bullet maturities likely.
	Subordinated debt likely to have enforceable rights.

institutional risk may prevent a project's rating from reaching the host country's foreign currency rating, notwithstanding other strengths of the project. That many infrastructure projects do not directly generate foreign currency earnings and may not be individually important for the host's economy may further underscore the risk.

In certain emerging markets, the concepts of property rights and commercial law may be at odds with investors' experience. In particular, the notion of contract-supported debt is often a novel one. There may, for example, be little or no legal basis for the effective assignment of power purchase agreements to lenders as collateral, let alone the pledge of a physical plant. Overall, it is not unusual for legal systems in developing countries to fail to provide the rights and remedies that a project or its creditors typically require for the enforcement of their interests.

Table 7

Institutional Risk Exposure Benchmark Scores

Score	Characteristics
1	Well-developed legal system; significant precedent exists. Well-developed financial system. Significant history of transparency in financial reporting.
3	Developed legal system; reasonable precedent exists. Developed financial system; enforcement culture still developing. Transparency in financial reporting may raise concerns.
5	Developed legal system; limited precedent exists. Financial system beginning to develop. Contract culture developing. Transparency just taking hold.
10	No legal statutes for project finance. Bankruptcy code not developed or not enforced. Banking sector poorly monitored and/or poorly supervised. Little contract culture.

Table 8

Force Majeure Risk Exposure Benchmark Scores

Score	Characteristics	Examples
1	Highly linear, simple operations. Loose linkages. Geographically spread out.	Toll roads, Pipelines, Hydroelectric power plants.
5	Greater complexity in operations. Specialized equipment used (compressors, generators, heat exchange, high pressure, high temperature). Tighter linkages of sequential operations.	Coal-fired power plants, Natural gas-fired power plants, Mines
10	Highly complex operations. Extremely tight linkages among system operations. Highly specialized equipment used. Operating accidents can be costly.	Petrochemical plants, Refineries, Liquefied natural gas, Nuclear power plants.

Force Majeure Risk

Project-financed transactions distinguish themselves from corporate or structured finance assets by their vulnerability to potential *force majeure* risks. *Force majeure* can excuse performance by parties when they are confronted by unanticipated events outside their control. A careful analysis of *force majeure* events is critical in a project financing because such events, if not properly recompensed, can severely disrupt the careful allocation of risk on which the financing depends. Floods and earthquakes, civil disturbances, strikes, or changes of law can disrupt a project's operations and devastate its cash flow. In addition, catastrophic mechanical failure, due to human error or material failure, can be a form of *force majeure* that may excuse a project from its contractual obligations. Despite excusing a project from its supply obligations, the *force majeure* event may still lead to a default depending on the severity of the mishap.

The risk of *force majeure* events, if unallocated away from the project, will limit most projects to the 'BBB' category or below. Occasionally, some types of project, such as pipelines and toll roads, can achieve ratings that are less affected by *force majeure* risk because of the improbability of such an event materially disrupting operations. Thus, pipeline and road projects can more easily return to operations, compared with a mechanically complex, site-concentrated project such as a refinery or liquefied natural gas plant. In addition, some rating increase may be possible to the extent that a project can mitigate *force majeure* risk with business interruption and property casualty insurance.

Credit Enhancement

Many third parties offer various credit enhancement products designed to mitigate project-level risks, sovereign risks, and currency risks, among others. Multilateral agencies, such as the Multilateral Investment Guarantee Agency, the International Finance Corp., and the Overseas Private Investment Corp., to name a few, offer various insurance programs to cover both political and commercial risks. The private

sector, such as the reinsurance industry, is also beginning to develop targeted insurance products designed to prevent a project from going into default for specific reasons. Project sponsors can themselves provide some type of support in mitigation of some risks—a commitment that tends to convert a nonrecourse financing into a limited recourse financing.

Unlike financial guarantees provided by monoline insurers, enhancement packages provided by multilateral agencies and others are generally not comprehensive for reasons of cost or because such providers are not chartered to provide comprehensive coverage. These enhancement packages cover only specified risks and may not pay a claim until after the project sustains a loss; they are not guarantees of full and timely payment on the bonds or notes. Although these packages may enhance ultimate postdefault recovery, they may not prevent a default. On a project default, the delays and litigation intrinsic in the insurance claims process may result in lenders waiting years before receiving an insurance payment. Even if a project has a debt-service reserve fund of six to 12 months, the effect of the reserve would be limited in preventing the default; the insurance payment could come well after the reserve funds have been exhausted.

For Standard & Poor's to give credit value to insurers, the insurer must have a demonstrated history of paying claims on a timely basis. Standard & Poor's financial enhancement rating (FER) for insurers addresses this issue in the case of private insurers (*see "Surety Policies as Mechanisms for Timely Credit Support in Project Finance Transactions," Standard & Poor's RatingsDirect, June 28, 2000; CreditWeek, July 19, 2000*), but it should be stressed that such policies or guarantees tend to be limited in scope and that as a result, ratings enhancement may be limited.

Outlook for Project Finance

For single-asset-based transactions and as an asset class for investors, project finance has seen a remarkable growth during the past 20 years This growth will likely continue. Hundreds of billions of dollars of debt have financed an ever-widening variety of projects in many industries and in many countries. Currency crises in the past four years have tested the structures and ultimately the financial viability of many projects; some have survived, while others folded. Political and country risks will continue to raise concerns for lenders. A remarkable shift has been the move away from contract-revenue deals to transactions that expose lenders to market and commodity price risks. Significant swings in commodity prices have already tested many projects; some have come close to insolvency. Moreover, as technology rapidly changes, projects are exposing their lenders to a greater variety of technological risks, especially as sponsors seek the extra edge to be more competitive. Despite the many challenges, as project sponsors' and their lenders' needs have changed, so has project finance in accommodating these new needs. Clearly, the risk profile for project finance is more complex than ever.

Standard & Poor's expects that project sponsors and their advisors will continue to develop new project structures and techniques to mitigate the growing list of risks and financing challenges. As investors and sponsors return to emerging markets, particularly as infrastructure investment needs increase, project debt will remain a key source of long-term financings. Moreover, as the pace of privatization and deregulation accelerates in all markets, nonrecourse debt will likely continue to help fund these changes. Standard & Poor's framework of project risk analysis anticipates the problems of analyzing these new opportunities, in both capital debt and bank loan markets. The framework draws on Standard & Poor's experience in developed and emerging markets and in many sectors of the economy. Hence, the framework is broad enough to address the risks in most sectors that expect to use project finance debt, and to provide investors with a basis with which to compare and contrast project risk.

Project Risk Benchmarks—Appendix

The analysis of project finance is largely a subjective exercise, although many quantitative techniques are available to assess comparative financial and competitive project attributes, such as sales price or cost of production. To facilitate comparing and contrasting key project risks across the spectrum of rated projects, Standard & Poor's has developed a series of benchmark scoring criteria for project-level and external risks (e.g., institutional, and *force majeure*).

Benchmark scores, expressed as integers, range from one to 10, with one being the least risky. Higher numbers represent exponentially higher risk (versus a linear progression), much as Standard & Poor's traditional rating scale does. The scores and their criteria are only

guidelines; they are not prescriptive but are flexible, given the specifics of a particular transaction.

The different benchmark scores are not additive, as they might be in a scoring-driven rating model. As project finance is a form of structured finance, a deficiency in one small part of a transaction, such as the lack of a debt-service reserve fund or an unsecured lending structure that prevents lenders from taking control of the project, could be cause for a speculative-grade rating. In such an example, a project could conceivably have relatively high benchmark scores in all categories but one and still achieve only a speculative-grade rating. Nonetheless, in general, scores of one to five will typically point to investment grade characteristics.

In the coming year, Standard & Poor's expects to publish project benchmark scores regularly.

Tax Effects on Project Finance Debt Service Coverage Ratios

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Standard & Poor's bases its project finance ratings on numerous criteria addressing the various categories of risk to which the project may be subject. Construction and operating risk, single asset exposure, legal and financial risk, market risk, and cost and supply risk, among others, all factor into the rating of a project.

One of the most visible, and quantifiable measures of project risk is the debt service coverage ratio (DSCR), the ratio of a project's cash flow to its debt obligations. But a review of project finance literature, project offering circulars, and project financial statements will reveal little consensus about the DSCR calculation. Project lenders should understand that, depending upon methodologies used, a DSCR may overstate, or understate, a project's credit strength. In particular, the effect of the project company and issuer's form of organization, and its tax environment can distort project-to-project comparisons of the DSCR in benchmarking project credits. As a matter of practice, Standard & Poor's has generally calculated, and will continue to calculate, project DSCRs on an after-tax basis. Confusion can arise because most projects do not have tax obligations while some cross-border transactions do have tax obligations.

The analysis of a project's financial profile will be a material determinant in its final rating. The extent to which a project can continue to pay timely debt service will directly affect its rating level. Projects that demonstrate a limited ability to meet debt service will struggle to achieve an investment-grade rating ('BBB-' being lowest investment-grade rating). By contrast, projects with financial structures that can easily meet debt service requirements, even during periods of financial stress, may (subject to the satisfaction of other criteria) more easily attain investment grade.

Standard & Poor's primarily relies upon the DSCR to determine a project's cash flow sufficiency. The DSCR is generally calculated by dividing a project's annual cash generated from operations by annual debt service. Standard & Poor's calculates project cash flow as revenue received from operations minus cash operating expenses. While other measures, such as net income, funds from operations, or EBITDA plus noncash items not accounted for by EBITDA, can be indicative of an entity's cash generation capacity, they are more susceptible to interpretation due to the effects of taxes and some noncash items. Debt service includes principal, interest, and certain financing fees. Standard & Poor's emphasizes that the calculation of the DSCR excludes the use of accrual methods (that may not capture all costs required to keep the project functioning), the use of interest income, and the use of trapped cash or reserve funds to substitute for cash flow from operations. Reliance on nonoperational funds to inflate a project's DSCR may result in a lower rating. Depending on a number of factors, investment-grade projects usually exhibit an annual minimum DSCR exceeding 1.3 times, with higher values for projects with material cash flow volatility due to market and commodity risk, among others.

The DSCR, as a matter of general rating practice, is calculated without regard to taxes simply because most projects do not have tax obligations. This practice evolved from the use by most rated project structures of tax transparent project and issuing entities, such as a general partnership (GP), limited partnership (LP), or a limited liability company (LLC), an entity that, at the election of its members, has the limited liability aspects of a corporation along with the tax transparency of a partnership. (*See "Revised Criteria for Special Purpose Entities in Project Finance Transactions*," Standard & Poor's Global Project Finance, *September 1997*.) In cases where the project and issuing entities are not subject to "entity-level" taxation, the DSCR is, more or less, an accurate gauge of the ability of the structure to meet its debt service obligations. In most projects rated by Standard & Poor's, and in virtually all of the projects located in the U.S. and the U.K., the project company and the issuer (if different) are "tax transparent," that is, not taxed at the entity level. Only the recipient of dividends is taxed. As a result, the tax component of cash flow is virtually always zero.

The use of a tax transparent project and issuing entity is not universal, however. In circumstances where the project or issuing entity is not tax transparent and thus liable to be taxed on

its income before distribution of debt service (as in cases where the project or issuing entity is a corporation), the amount of cash available for debt service may be materially reduced. Tax obligations must generally be satisfied before debt service. In cases where the project company or issuer is subject to entity-level taxation, the use of the DSCR without adjustment for such tax may be misleading. Moreover, the taxation of the project and issuer at the entity level need not preclude the imposition of another level of taxation to the bondholder.

In instances where either the project's form of organization or the local tax requirements require a project to pay entity-level taxes on, among other things, income, interest paid overseas, interest on dividends, and management and other fees, Standard & Poor's will calculate the DSCR by treating host country taxes as ongoing expenses necessary to keep the project operational. While such a practice may seem to unduly penalize a project when its DSCR is compared to projects that do not pay taxes, the justification is simple; such taxes have a higher claim in a project's cash waterfall than principal repayment. And projects, particularly investment-grade projects, generally have amortizing debt structures in order to mitigate refinancing risk of bullet maturities that are more characteristic of corporate finance. For credit purposes, Standard & Poor's considers these taxes as recurring project expenses that must be met in order to keep the project in compliance with applicable law. This is the case even where the tax payment is allocated after principal payment in the documented cash waterfall and tax payments are not deferrable.

Table 1

Sources of Typical Project Tax Obligations

- Income tax
- Goods and services taxes
- Withholding tax on interest paid overseas
- Withholding tax on dividends paid overseas
- Taxes on project management fees paid overseas

Table 2

Calculation of Project DSCR

Total Cash Revenues
Less cash expenses needed to stay in business*:
- Operating expenses
- Overhead expenses
- Royalty expenses
- Management fees
- Miscellaneous expenses

Cash Flow Before Taxes
Less taxes due:
- Taxes on interest expense
- Taxes on dividends paid
- Taxes on management fees
- Income taxes

Cash Available for Debt Service/Debt Service
Debt service:
- Annual interest expense
- Other financing costs, e.g. swaps, LOC fees, etc.
- Current portion of principal

DSCR = (Cash Available for Debt Service)/ (Debt Service)

*Excludes noncash items

The extent to which there is cash left after payment of taxes will factor into a project's credit profile. That some projects pay no taxes while others must contend with a heavy tax burden, is generally the result of host country laws or choice of organizational form. Although the absence of an entity-level tax obligation will not, in and of itself, mitigate the financial risk of a project's weak cash flow, the reality is that after-tax DSCRs are frequently lower than pretax DSCRs, and that, all else being equal, projects that can avoid taxes will generally have higher credit ratings. Standard & Poor's distinguishes between tax avoidance, which is legal, and tax evasion, a practice that will generally invite serious legal problems from the tax authorities.

Standard & Poor's emphasizes that projects with tax obligations seeking investment-grade ratings should demonstrate post-tax DSCRs comparable to other projects in the investment-grade range. In addition, in those projects susceptible to entity-level taxation, Standard & Poor's may require additional comfort on the nature and effect of those projects' tax structures. In some cases, Standard & Poor's has required prior approval of the arrangements by the relevant tax authorities in order to achieve an investment-grade rating. Furthermore, the calculation of the DSCR used to govern distributions to equity should be calculated after giving consideration to tax obligations. Again the

rationale for this practice is simple; the single asset aspect of projects demand a cash cushion in order to weather adverse events or times. Standard & Poor's emphasizes that project and financing documentation should reflect that DSCRs that govern covenants must be calculated after considering taxes.

As a guide to investors and project sponsors and their advisors, Standard & Poor's offers a simple principle: if project taxes have a strong and annually recurring claim on cash flows, Standard & Poor's will calculate DSCRs after accounting for taxes. As a standard practice, Standard & Poor's will consider that all DSCRs are calculated after-tax, even though some projects will not have obligations. In addition, the calculation of the DSCR is always based on one-year's time period because it represents a fair portrayal of a project's ability to meet its debt service. Calculation for shorter periods may be biased by timing and seasonality differences.

IS THE GOLDEN AGE OF THE LIQUEFIED NATURAL GAS INDUSTRY REAL, OR IS IT PYRITE?

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Liquefied natural gas (LNG) has long since established itself as a viable and lucrative part of the global oil and gas business, and by some accounts, the LNG industry may be entering its golden age. Each week the trade press announces another project expansion or a new supply agreement signing. LNG has become affordable to more countries through the effects of sustained economic growth, and an increasing number of these countries have made the investment in natural gas storage and transport infrastructure, which is so necessary to complete the value chain from wellhead to burner tip. For several Asian countries, without indigenous fossil fuels and concerned about over-reliance on crude oil imports from the Middle East in the 1970s, LNG has provided a critical diversification component of their energy supplies. Now countries in Europe, such as Spain, Portugal, Italy, and Turkey, are seriously considering importing significant quantities of LNG on a long-term basis. And in the U.S., the recent energy crunch may have pushed natural gas prospects high enough to encourage a sustainable LNG market. Finally, LNG's increasingly attractive stature as an environmental fuel of choice bodes well for the industry, and the cost to produce and deliver LNG has dramatically fallen.

But, is the LNG industry about to enter its golden age? Will LNG's cost drop enough so that it will sustain a fuel of choice status? Alternatively, is LNG expanding so rapidly that it may soon flood the market with an attendant price collapse? Have LNG's promoters over estimated the global demand of LNG and its attendant financability? Is the credit gulf between such top-tier LNG importing countries, such as Japan and Taiwan, and second tier candidates, such as India, too great to support significant LNG expansion? Will a global LNG spot market develop? Or, is the LNG industry about to push itself into a dangerous oversupply situation that could threaten many projects that have increasingly relied on highly leveraged project finance structures? Instead of lining their pockets with gold, investors could find themselves holding pyrite (also known as fool's gold).

Regardless of where the LNG market heads, the past several years have seen two major new trends in the LNG business: The market for LNG has materially changed and capital costs have fallen. How LNG projects exploit these changes will distinguish the financable projects from those that merely appear as onetime news flashes. Keys to success will extend beyond the ability to sign a long-term supply and purchase agreement (SPA) with a creditworthy customer.

Changing Market Needs

The market for LNG has dramatically expanded over the past quarter century, as increasingly diverse customer needs have begun to be addressed by this niche fuel—needs that now extend beyond just ensuring security of supply. Broadly, four major changes in the market are driving an increase in demand:

- Fewer concerns over security of supply,
- Growing spot sales market,
- A desire to de-link LNG prices from crude oil, and
- Natural gas' growing status as a fuel of choice.

Fewer concerns over security of supply. Desire for long-term security of LNG supplies, which historically drove LNG contract negotiations, lead to lucrative 20-25 year deals, some with price floors. Most SPAs have provided such predictable revenues that they easily supported the financing and construction of large LNG projects, such as Australia Northwest Shelf, RasGas (also known as Ras Laffan Liquefied Natural Gas Co., BBB+/Stable/—; in Qatar), and Oman LNG (Oman). These SPA deals featured take-or-pay provisions with only limited abilities to defer cargoes from one year to the next because of operational limitations or demand reductions. Typically, the buyer makes good on any deferred volume or agrees to pay liquidated damages. Indeed, no project sponsor would even have considered undertaking the multibillion effort of building an LNG liquefaction and storage complex without an executed supply and purchase agreement that ensured a highly predictable offtake volume and price structure.

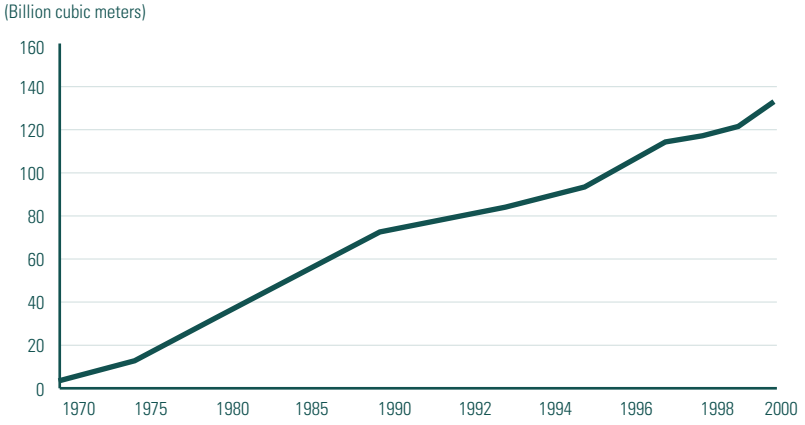
The Asian financial crisis in 1998 marked a turning point for LNG projects and signaled a clear need for a more flexible LNG market. In Korea, particularly, the crisis triggered a sharp drop in energy consumption as the economy faltered. As a result, Korea's contractual LNG

import obligations far exceeded its needs and it had to curtail LNG deliveries. As the Korean economy recovered, full contractual LNG shipments resumed. The Korean experience highlighted an underlying characteristic about energy markets: energy consumption adjusts considerably as the weather and the economy change, among other factors. Consequently, potential buyers of LNG, particularly those that have already built a solid base load LNG supply, now want flexible take volume provisions without penalties incorporated into contracts for incremental supplies. Hence, long-term security of LNG supply ranks lower on a buyer's list of priorities. Indeed, fewer buyers want the long-term liability that comes with a 20-25 year SPA. Many LNG buyers are not prepared to take the risk that their end-use customers' requirements (e.g., independent power producers or residential heating) could suddenly drop. Where suppliers can craft flexible contracts, markets for LNG should increase. In the near term, Standard & Poor's expects that LNG suppliers will need to offer a variety of LNG contracts, which may feature one or any combination of the following contract volume provisions:

- Long-term SPAs: Traditional 20-25 year contracts with well-defined volumes with limited

Chart 1

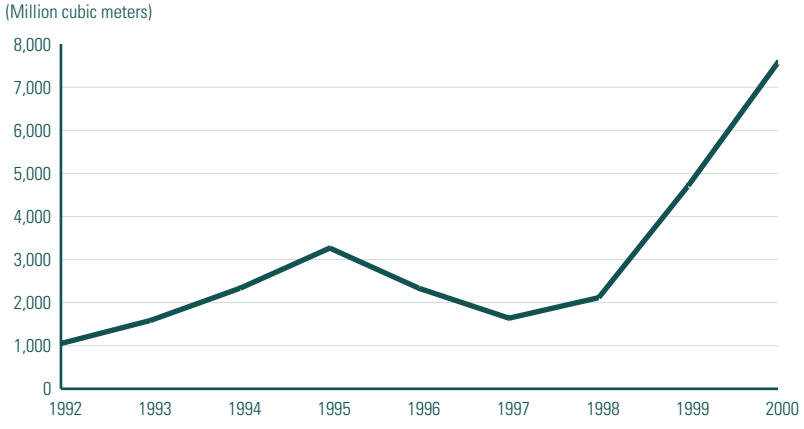
World LNG Trade Has Grown 15% Per Year (1970-2000)



Source: Gas Technology Institute.

Chart 2

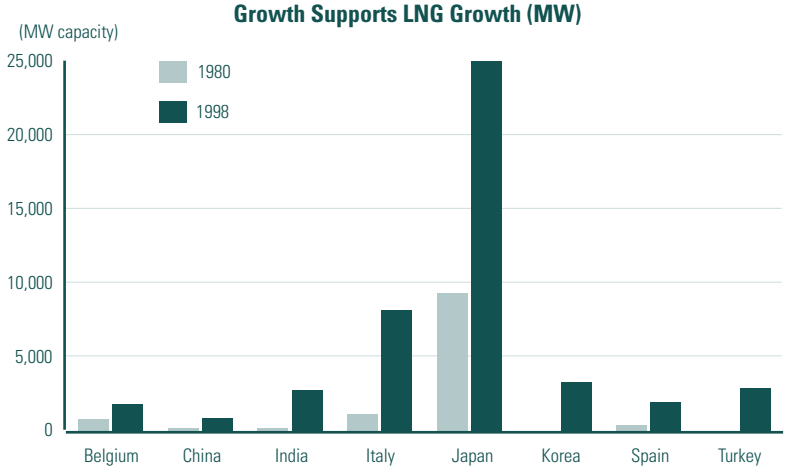
Global LNG Spot Market Sales Growth (1992-2000)



Source: Petrostrategies, Gas Technology Institute.

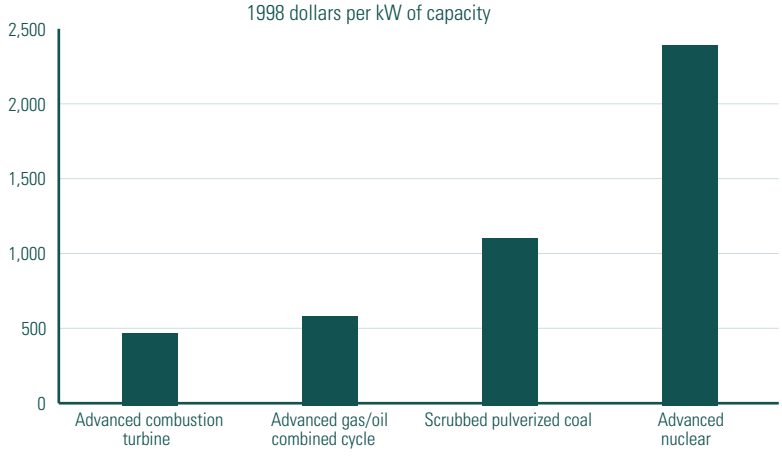
abilities to defer LNG cargos from one year to the next.
- Short-term SPAs: 5-10 year contracts with well-defined volumes and limited abilities to defer LNG cargos from one year to the next.
- Flexible-SPAs: LNG contracts that resemble a requirements-based contract without the need to make good on deferrals.
- Seasonal SPAs: Shipping schedules that account for seasonal variations in energy consumption (e.g., summer versus winter).

Chart 3
Installed Natural Gas-Fired Generation Growth Supports LNG Growth (MW)



Source: 2000 World Bank Indicators, Table 3.9, Sources of Electricity.

Chart 4
Overnight Capital Costs of Power Generation Equipment
1998 dollars per kW of capacity



Source: Energy Information Agency, U.S. Department of Energy.

- Tradable cargos: Provisions that allow the contractual buyer to divert cargos on a spot basis to a different buyer.
- Spot cargos: Contracts for limited cargoes, varying from one to five or so shipments and priced against a benchmark price in the buyer's market.

While such terms may support an expanded LNG market, the credit implications for sellers should be obvious. Absent some form of mitigation, or hedge, uncertain sales volumes will likely increase credit risk for LNG projects. Moreover, netbacks from spot market sales have only recently been high enough to justify the costs during very elevated peak pricing periods.

Growing spot sales. The sudden increase in spot cargos characterizes one of the more dramatic changes to the industry in recent years. Historically LNG tanker construction orders accompanied specific projects; shippers knew that they could virtually guarantee full usage of an expensive tanker for the duration of a long-term SPA. No practical spot market for LNG existed, at least in volumes that could sustain speculatively built tankers. Moreover, the economics of operating receiving and regasification terminals have typically required year-round utilization to justify the enormous capital investments. Such dynamics almost ensured that a spot market for LNG would be slow to develop. That buyers have generally insisted on owning and controlling tankers almost guaranteed that sellers would have a difficult time securing tankers for LNG spot sales.

But the industry has seen a shift in the past few years. Several LNG suppliers have taken a number of LNG tankers out of mothballs, restored them, and put them into service on a short-term basis. Three new projects with excess capacity—RasGas, Oman LNG, and Atlantic LNG—have been able to take advantage of favorable conditions in the U.S., Europe, and Asia to sell spot cargos. Even traditional buyers of LNG under long-term SPAs, such as Korea, have recently needed spot cargos during the winter to meet peak season heating needs. In the U.S., where gas supplies have been inadequate at times, due either to wellhead deliverability limits or transmission constraints, to meet the growing gas-fired power generation market, a spot market may becoming viable, especially if peak electricity prices can justify spot LNG cargo prices. Restoration work on two U.S. regasification terminals that were closed in the 1980s due to lack of demand and abundant

energy supplies has recently begun. Unfortunately, the two-three year lead time on new tanker construction will tend to dampen the spot market, except for those with the greatest appetite for risk.

De-linking from crude oil. LNG markets that have developed beyond the traditional markets in Japan, Taiwan, and Korea increasingly want to de-link LNG pricing from the customary Japanese Customs Clearing price (JCC price)—the weighted-average price of a basket of crude oils delivered into Japan. Historically the JCC price was an appropriate benchmark because LNG imports could displace crude oil. But as LNG use spreads, potential buyers want to link LNG prices to alternative fuels. In the U.S., where LNG importing prospects look promising, LNG contracts may price against Henry Hub natural gas prices—a commodity price strongly linked to electricity prices. Some buyers have proposed linking LNG contract prices to a basket of imported fuels that include coal, among other fuels.

Linking LNG to alternative fuels will tend to make LNG more competitive, but, absent hedging, could pose a credit risk for lenders to suppliers if commodity price risk becomes volatile. Electricity and natural gas prices, for example, show much greater volatility than crude oil. The U.S., for instance, has recently seen very volatile commodity price movements in the markets—a situation that would certainly raise credit risks for LNG projects solely targeting the U.S. Moreover, most LNG sales into the U.S. will need a landed price of at least $3.25 per million BTU, which exceeds the long-term Henry Hub price of about $2.90, to sustain a long-term business.

Fuel of choice. Natural gas' status as a fuel of choice globally has expanded the demand for LNG in markets where little or restricted access (geographical or temporal) to natural gas would otherwise restrict LNG's growth. Several factors over the past decade have made natural gas a premium fuel globally, especially for power generation. First, compliance with existing, or expected, air pollution standards is driving natural gas' attractiveness. Natural gas-fired generation emits fewer regulated pollutants and waste products, such as sulfur dioxide, nitrogen oxides, and airborne solid particulates, than other types of generation. Ash and radioactive waste are simply not concerns for natural gas users. Such an advantage over other fuels favors LNG, but it likely adds a price premium to natural gas against other fuels on a BTU basis.

Second, gas-fired generation is cheap and quick to build. Combined-cycle gas turbine generators generally require a smaller capital outlay than the construction of nongas-fired generation plants and a shorter construction period. Construction for a gas-fired power plant takes only about two years against a four to five construction period for coal, or even longer for nuclear power. As a result, over the past 10 years, many markets without access to natural gas have either chosen, or are considering the option, to import LNG for power generation where capital for new generation is available. Although, as Enron Corp.'s well-publicized experience with its Dabhol plant in India demonstrates, LNG-fired power generation, despite access to capital, can still present a credit risk in markets not able, or willing (or both), to pay the premium. India alleges that it just cannot afford the power.

And finally, demand for natural gas will likely increase as concern grows over the potential for greenhouse gases to cause global warming. Natural gas emits less carbon dioxide than competing fossil fuels. Hence, even if other fuels are cheaper on a BTU basis, LNG may be more competitive given the externality cost of carbon dioxide emissions or other pollution concerns.

The U.S. market—A special case. The U.S. represents a unique LNG market. For years North America, with the world's most extensive natural gas pipeline system, has been virtually self sufficient in natural gas production, save for New England. In New England, because pipeline capacity constraints have limited natural gas consumption growth, it imported small amounts of LNG through the Boston terminal to meet peak shaving needs in the winter. Last year, however, saw a record run-up in natural gas prices, as prices hit just above $10 per million BTU on average—$40 per million BTU on the west coast. Record temperatures, both hot and cold, and the rapid increase in gas-fired power generation strained North America's ability to supply conventional natural gas. At these rarefied prices, the U.S. gas market became extraordinarily lucrative to LNG exporters, particularly with world LNG prices hovering around $3.20 per million BTU. Unfortunately, low LNG spot tanker availability and few LNG storage and regasification terminals in the U.S. limited the near-term import potential. In response to encouraging price signals, however,

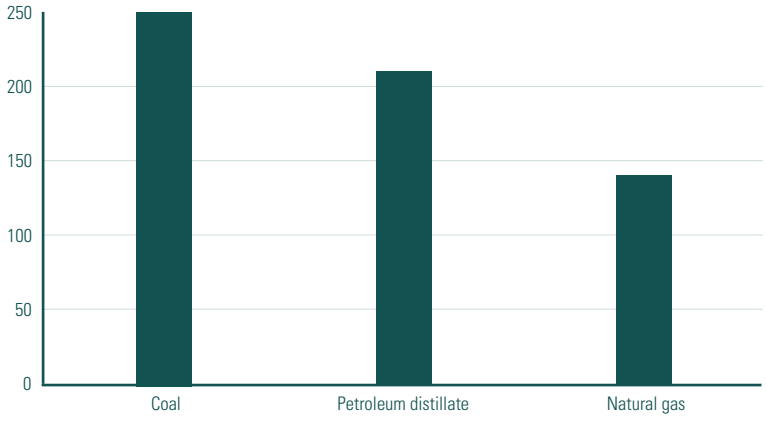
a number of oil, gas, and electricity companies, including El Paso Corp., Texaco Corp., and Enron Corp., have announced plans to build storage and regasification facilities to service the U.S. market.

Natural gas prices have recently fallen to about $2 per million BTU in response to new gas-well drilling and moderate weather. Nonetheless, many industry observers have concluded that the U.S. natural gas market, driven by the power industry, has structurally changed and hence, will need LNG imports to meet demand needs that could hit 30 trillion cubic feet a year by 2010. That record gas-well drilling activity in the U.S. is discovering fewer and smaller gas reserves per well with limited deliverability supports these claims. Even so, commodity price risk—something that has shown extreme volatility of late—will likely make a U.S. LNG market a risky bet for some time. Potential new gas supplies in large quantities from Alaska or the Mackenzie Delta could dramatically improve the domestic supply picture. Given the size of capital investments needed on the receiving end, LNG importers will likely enter this market slowly, if not with a healthy skepticism.

Chart 5
Nominal Capital Costs for 91 Gas-Fired Units in the U.S.

Source: Platts.

Chart 6
Pounds of Carbon Dioxide Released Per MWh



Source: "Steam, Its Generation and Use," Babcock and Wilcox and U.S. Department of Energy.

Lower Capital Costs

Changes and improvements to LNG technology have fueled an explosion of new project announcements. In short, producing and shipping LNG cost much less than it did just a decade ago. As a result, abundant gas reserves that once had little or no value can now commercially reach more customers worldwide than before.

New technology developments and improvements in refrigerant and liquefaction techniques have lowered the capital costs of these most expensive LNG processes. Since 1988, nominal liquefaction capital costs have fallen to about $200 per ton of LNG capacity in 2001 from about $550 per ton, according to data in the *Oil and Gas Journal*. Technological improvement is also allowing sponsors to build production trains with increasing throughput capacity. The latest designs can process about 3.3 to 3.4 million tons per year of LNG, up from about 2.0 million tons about 10 years ago. Moreover, projects that expand into third and fourth trains, such as Atlantic LNG, Oman LNG, and RasGas, will benefit from economies of scale because they further lower the LNG production cost per ton. Most expanded projects will generally share certain common facilities, such as site preparation, utility infrastructure, LNG storage tanks, loading docks, administrative, and overhead.

Lower tanker prices are also driving the global LNG market, especially the spot market. The cost to build an LNG tanker has fallen dramatically, nearly 50% during the last decade. Since 1997 the cost per tanker has dropped to about $175 million per vessel from about $225 million. Some of the drop occurred during the Asian financial crisis, as Korean shipyards fought for dollar-denominated tanker construction contracts. Prices recently have inched up, as

LNG slots are completely full for the next few years. Nonetheless, nominal costs to build tankers have fallen, as shipbuilders have developed new techniques and greater experience with LNG tankers.

Keys to LNG Project Success

Project finance has played a vital role over the past several years in financing the latest generation of LNG projects—projects, for a variety of reasons, sponsors elected to keep off their balance sheets. Recent project financings have included QatarGas, RasGas, Oman LNG, and Atlantic LNG. Going forward, as buyer needs become more diverse, some project sponsors may find their efforts to structure investment-grade transactions frustrating. Indeed, the flood of new LNG project announcements may be signaling a temporary LNG oversupply (should these announced projects reach commercial completion, especially if total capacity significantly exceeds contract volumes). In Standard & Poor's evaluation of project-financed LNG projects, we begin the analysis with our customary project finance framework *(see Standard & Poor's "Debt Rating Criteria for Energy, Industrial, and Infrastructure Project Finance," March 19, 2001)*. Nonetheless, six key features will tend to distinguish the successful LNG projects:

- Access to stranded gas reserves,
- Lower capital costs,
- Associated product sales,
- Reliable shipping arrangements,
- Balance sheet strength, and
- Creditworthy buyers.

Access to stranded gas reserves. Access to abundant, but stranded, gas reserves is one of the key determinants to success in the LNG business. Absent an LNG project, geographic realities will strand natural gas reserves if a pipeline cannot bring the gas to market. In addition, if natural gas reserve quantities and their reserve lives far exceed domestic needs, much of the economic value will be stranded. For instance, natural gas reserves in Qatar, which are about 500 trillion cubic feet, not only far exceed domestic needs of its population of 400,000 for the next several hundred years or more, but Qatar's distance from major energy consumption centers precludes an economic pipeline solution. The RasGas and QatarGas LNG projects allowed Qatar and project sponsors to profitably monetize these reserves. Other formerly stranded gas reserves that have been successfully monetized through LNG projects include those in Alaska, Algeria, Australia, Brunei, Indonesia, Malaysia, Nigeria, Trinidad and Tobago, and United Arab Emirates. Significant gas reserves currently remain stranded in Egypt, Iran, Russia, Venezuela, and Yemen; these countries are all considering LNG projects.

Besides having access to abundant natural gas reserves, the more profitable LNG projects will benefit from reserves that are easily produced. Gas produced from high-rate wells in large reservoirs will generally improve a project's profitability. Conversely, projects that have to drill many wells in geographically diverse fields may detract from profitability. Such projects may see operating costs increase if they have to build extensive gathering systems, operate many wells, and drill replacement wells as they deplete.

Typically, LNG projects have monetized gas reserves owned by the host country or the host country's state-owned oil company. Project sponsors, whose ranks have always included the major multinational oil companies, operate LNG projects through some type of concession or joint venture agreement, or both. While the terms of the concessions vary, the state captures its economic value through any number of combinations of the following:

- Royalties calculated on the project's net income,
- Royalties calculated on the project's gross revenues,
- A per-unit charge for gas delivered to the project, and
- Dividends based on the project's profitability and the state's percentage ownership in the project.

To the extent that a project can avoid paying predebt service expenses, such as gross revenue royalties, it may enhance its credit strength compared to projects where royalties will appear more like recurring expenses.

Lower capital costs. As the LNG business becomes more competitive, LNG projects can improve their competitiveness by minimizing capital outlays. LNG projects, which consist of expensive upstream, gas processing, liquefaction, storage, and offloading port facilities, generally need several billion dollars to be brought on-line. To the extent that project sponsors can bring down the installed cost per ton, projects will become more competitive as they bid for new customers, particularly those willing to sign SPAs for the long-term market.

Extensive engineering and design work done prior to awarding construction contracts will likely keep capital costs down. The newest projects that have come on-line recently spent considerable effort on preconstruction design and engineering work. As a result, project sponsors had very little design and scope changes, a situation common to large construction projects and one that can dramatically drive up costs. Moreover, engineering, procurement, and construction (EPC) contractors could bid on projects with the confidence that preliminary design work will minimize changes and problems often associated with cost increases and schedule delays. In addition, these projects will begin commercial operations ahead of schedule, thus reducing interest costs.

Finally, to the extent that project sponsors can finance LNG projects with long-term debt and favorable interest rate spreads, their projects will be more competitive. Projects that can locate in countries with stable political and regulatory regimes and can also sell to creditworthy customers will likely attract investment-grade financing terms. On the other hand, projects located in challenging environments or those attempting to sell LNG to customers with uncertain credit may need to rely on sponsor equity and expensive political-risk insurance to keep financing costs down, if lenders perceive the risks to be higher.

Associated product sales. In addition to selling LNG, most LNG projects augment their base revenues with sales of by-products of gas processing. In some instances the revenues can be significant and, as such, can lower a project's break-even LNG price. The three most common by-products of LNG production are the following:

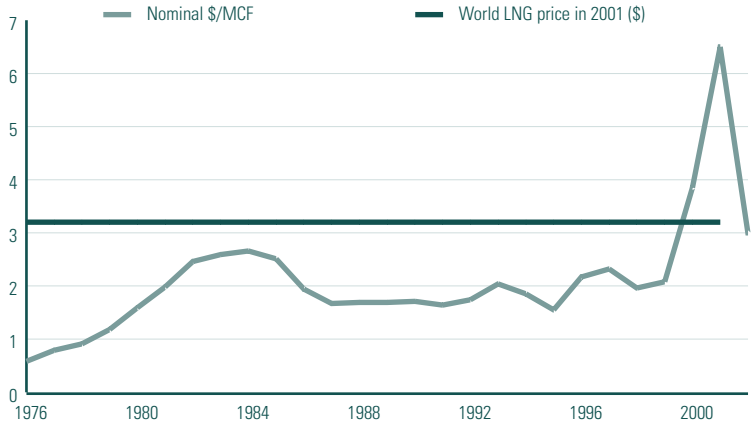
- Condensate, which is sold on the world market,
- Sulfur, which is sold on the world market, and
- Natural gas, which is sold into local markets.

Condensate, the light hydrocarbon liquid frequently associated with natural gas production, can be particularly valuable. Unfortunately, only by luck of geologic circumstances will projects be able to sell condensate. RasGas and QatarGas in Qatar produce LNG from a condensate-rich gas reservoir. Other projects either produce LNG from a dry gas with little condensate or do not have rights to the condensate. In the latter case, another production entity may be processing upstream gas, stripping out condensate for sale, and then delivering dry gas to the LNG project. BPAmoco's Atlantic LNG is one such project. On the other hand, if condensate volumes are not significant, the capital costs required to process upstream gas and recover the condensate may offset the revenue potential.

Sulfur, which a project must strip from the natural gas before it goes to liquefaction, generally is not a valuable revenue source. To the extent that a project can recover sulfur-processing costs through sulfur sales, it will be ahead of the game. Obviously, if an LNG project is fortunate to have gas supply that is naturally free of sulfur, it will not have to address the problem.

Chart 7

Average U.S. Wellhead Price

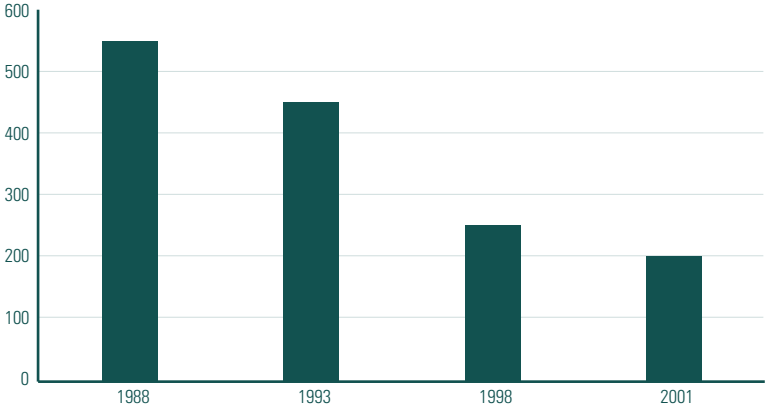


MCF-Million cubic feet. *Source:* Oil and Gas Journal, Jan. 29, 2001.

Chart 8

Falling LNG Plant Capital Costs

Nominal dollars per ton per year of capacity



Source: Oil and Gas Journal, Oct. 2, 2000.

Reliable shipping arrangements. LNG shipping arrangements will influence an LNG project's success. The further a LNG project is from its targeted market, the higher the cost of shipping. These costs will manifest themselves in the number of ships needed, as well as the operating costs. If the buyer is responsible for shipping, the SPA will tend to discount the contract LNG price to account for shipping. Projects located closer to their markets will likely need fewer ships, all else being equal, because of the shorter round-trip transit time. Projects located farther from their markets, such as Oman LNG and RasGas, have been able to compensate for the greater distance, and attendant shipping costs, through economies of scale, low production costs, and large SPAs. Hence, realized net back profits from distant markets in the Far East or in the Western hemisphere are quite attractive.

Generally, as mentioned above, few buyers will cede control and ownership of LNG tankers to the LNG projects. Nonetheless, some projects are considering building and owning tankers on a speculative basis to take advantage of the growing spot market. Given the cost of a tanker relative to the cost of the upstream and liquefaction capitals, some projects may find it profitable to own one or two tankers, especially if large spot markets continue to develop.

Balance sheet strength. The barriers to entry into the LNG industry are extraordinarily high. One of the biggest barriers is raising the capital needed to build a project. To date only the largest multinational oil companies and state-owned oil companies have had the capital resources to develop LNG projects. While many LNG projects rely on project financing to raise debt, the reality is that these projects all have some limited recourse to their sponsors.

The ability to guarantee construction and completion has proven to be a valuable credit enhancement that only a few companies can provide. Because of the multibillion-dollar costs of an LNG project, no one EPC contractor is willing, or able, to provide the fixed-price, turnkey, date-certain contract typical of many project financings.

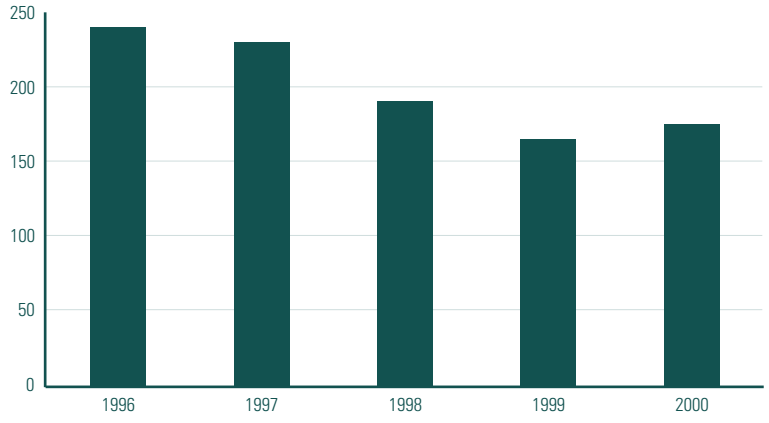
Typically a consortium of contractors will build an LNG project, and each contractor will limit its liability to some fraction of its contractual obligations. Hence, the concept of liquidated damages for delays and performance problems carries little meaning for LNG projects. Instead, sponsors have found it easier to guarantee completion, typically on a several basis in proportion to equity interest. Hence, substantially all sponsors will usually need investment-grade credit standings to build an investment-grade LNG project.

In some instances, such as with RasGas, a sponsor may extend its balance sheet to provide credit support during operations if LNG prices fall to levels that cannot sustain debt service. ExxonMobil, for instance, provides RasGas with a revolving $200 million line of credit if LNG prices drop too low to provide debt service. Oman LNG, the Omani state-owned oil company, provides gas to the project and subordinates

Chart 9

Lower LNG Tanker Costs

Nominal Mil $ per 138,000 cubic meters



Source: Clarkson Research Studies, Oct. 26, 2000; Oil and Gas Journal, Aug. 21, 2000.

payment for gas indefinitely if LNG prices are insufficient to service the project's debt.

Creditworthy buyer. Having a creditworthy LNG buyer is not only a key to a successful LNG project, it can be the deciding factor as to whether a project goes forward. Several factors, together, determine whether a market is a creditworthy risk:

- An offtaker with investment-grade credit strength sufficient to back the SPA;
- An offtaker located in a country with a developed natural gas transmission and distribution infrastructure;
- An offtaker with a sufficient balance sheet to finance the construction of LNG shipping, receiving, and regasification facilities;
- A market where LNG has become a critical component of energy supplies and not easily displaced by pipeline gas or other fuels;
- A diversified market where natural gas serves a mix of power generation, industrial, and residential uses (heating and cooking);
- A market located in a healthy and growing economy that can sustain LNG's premium status for the long-term; and
- A public policy supportive of LNG imports—a quality that will tend to result from having a healthy economy.

Absent these characteristics, a LNG project may struggle with long-term profitability concerns. Indeed, if project sponsors and lenders cannot reasonably foresee that a prospective LNG market can sustain the above characteristics, the prospective LNG project may never get past the concept stage.

Over the past couple of years, a large second tier of potential LNG importing countries, including India and China, has raised the prospects for new LNG projects. The potential demand from these two countries is enormous. Neither have indigenous natural gas supplies in any meaningful quantities. Air pollution concerns have grown serious and natural gas-fired power generation may play an important role in improving air quality. But very little infrastructure exists to receive or transport natural gas. Moreover, offtake credit quality will raise concerns with lenders, especially as fewer governments are backing obligations of their sector utilities (as Enron's Dabhol power plant's difficulties with the Indian government vividly demonstrate).

Outlook For LNG

Standard & Poor's sees a mixed outlook for LNG projects. Certainly the macro trends point to an improving market for new LNG projects. On the supply side, declining capital costs, improvements in productivity, and economies of scale are lowering the threshold for economically feasible projects. Demand side prospects are also improving, as LNG becomes more affordable and environmental concerns make natural gas a fuel of choice. In addition, project developers are beginning to address market needs with more flexible contract terms that disengage from the traditional long-term take-or-pay contracts. Many new project announcements point to a new optimism, suggesting LNG's golden age has arrived.

Nevertheless, Standard & Poor's cautions that LNG's gold may be pyrite for some investors. An oversupply of LNG projects could drive down LNG prices. The spot market will likely develop much slower than many would like to see, in part due mostly to a lack of LNG tanker availability. And finally, as this year's violent energy price volatility in the U.S. underscores, LNG price uncertainty will, or perhaps, should, make all but the bravest lenders wary of optimistic sponsor forecasts and project scenarios of success. Projects whose economics anticipate a vibrant U.S. LNG market developing may be putting prospective lenders in harm's way.

Mining Project Finance Lessons for All Projects

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Standard & Poor's considers the mining industry to have a high degree of risk. Single-site projects may have even greater risk. In addition to individual mines' characteristics, contributing to this view are construction difficulties posed by a project site's remote location, the infrastructure necessary for effective access to and transportation from the project, prevailing weather, local political conditions, and labor and personnel issues. Moreover, when a resource project (in contrast to a mining company) issues debt, the rating will also reflect the project company's limited financial flexibility, as well as the lack of geographic and mineral diversity.

The risks involved in developing and constructing a resource project tend to be at least somewhat site-specific. The physical and geological uncertainties characteristic of resource projects can be daunting, unlike those for power generation plants, for example, for which construction risks (at least for projects built by recognized contractors) have become increasingly manageable through standardized processes and repeated installation of project equipment.

The default of Bulong Operations Pty Ltd. (BOP) in June 2000 and the downgrade of the issues associated with the Murrin Murrin Holdings Pty. Ltd. (MMH) nickel laterite project illustrate lessons that are appropriate for all projects. The Murrin Murrin project achieved mechanical completion one year late and over budget. The independent engineer reported that the project's completion was delayed significantly beyond the expected completion date due to changes in the selection of materials from initial design due to design changes, mechanical and design failures, and lack of quality control. BOP's default illustrates the need for adequate cash reserves for start-up projects using unproven technology or an innovative design.

Classifying these projects as mining projects can be misleading. In both projects, the mining activity was low risk and represented less than 10% of total project costs. The greatest risk by far was in the treatment plant, which processed the ore to produce primary metal for sale. Both plants used unproven technology and a design that had not been thoroughly tested. Standard & Poor's has developed a general framework for analyzing such projects that incorporates our approach to mining projects *(see Standard & Poor's "Debt Rating Criteria for Energy, Industrial, and Infrastructure Project Finance," published on March 19, 2001)*.

The lessons that can be learned from these projects include:

- Incomplete design can lead to cost overruns,
- Supervision during construction and ongoing independent reporting are important risk mitigants,
- Liquidated damages are not the same as cash,
- Commodity risk can be reduced through the financing structure, and
- Hedging is a double-edged sword.

In contrast to the Bulong and Murrin Murrin projects, the rating on the bank loan on Straits (Nifty) Pty. Ltd. proves that an operating mining project can achieve an investment-grade rating if it is well-structured and uses proven technology. Standard & Poor's has assigned ratings to five issues for three mining projects, all operating in Western Australia *(see table for mining project issue ratings)*.

Incomplete Design Can Lead to Higher Construction Costs

Having a strong construction contract is a positive rating factor, but even the most carefully crafted document cannot cover all foreseeable eventualities. Construction risk can be mitigated by having a comprehensive, fixed-price engineering procurement and construction (EPC) contract. In the case of the Murrin Murrin project, the construction contract was with a well-rated construction consortium. Although the original Murrin Murrin EPC contract was for a fixed price, the total lump sum payable increased as a result of contract variations and foreign exchange rate fluctuations. This, together with other infrastructure costs outside the EPC contract, resulted in total project costs that ran well the above the original estimate.

Contingency amounts are built into construction contracts in general to cover unexpected changes during construction. They should also be sized to cover construction costs outside the construction contract, but are not sized or intended to cover design and other changes.

But, construction contracts cannot eliminate all risk to a project. As projects progress from

power station design to unique designs, some risks become more important than others and are worth highlighting. Some residual project risk generally remains that is not passed on through the construction contract and that is outside the control of the contractor or vendor, such as:

- Delay in the close of financing, leading to increased cost of components,
- Design variations due to an incomplete design or changes that are required to comply with permitting and environmental approvals issued after signing of the contract,
- Sponsor-requested design variations from the original fixed price,
- A sponsor taking components outside the contract that were originally part of the fixed-price contract and subsequently adding more costs to the project than first estimated,
- Certain changes in law,
- Defects accepted by the sponsor that the contractor has not rectified at the contractor's cost. In many cases, a sponsor may determine that it is more beneficial to rectify a fault when found, rather than wait for the construction contractor to fix it,
- Latent conditions, such as unforeseen ground conditions and inaccurate information, that could not reasonably have been discovered by a prudent, experienced, and competent contractor,
- Certain contingent costs, such as items payable in foreign currency, that differ from those allowed for in the contract price, and
- Escalations that differ from expectations.

Variations can be beneficial to a project by increasing the life of the plant or reducing the cost of ongoing maintenance. But for a company with limited financial flexibility, these are luxuries many projects cannot afford.

Completing design and testing components at actual scale and under operating conditions can lead to lower costs.

Supervision and Reporting Are Important Risk Mitigants

By definition, contractors of single-site, unique plants have limited experience at delivering these projects. The owners of the Murrin Murrin project relied on its construction contractor to complete the project and did not have adequate owner supervision. Standard & Poor's experience is that the start-up period of any complex project is often subject to poorer performance and higher costs than initially predicted, and the risk of default is higher during this period. The Bulong project was complex, with the risk that plant throughput and product quality and quantity might not meet forecasted standards. Operating costs are higher during start-up, with greater plant interruptions and additional costs incurred as each ore type's behavior is fully understood.

Lenders need to have access to progress reports until the project has reached a level of operation that is economically sustainable. Construction progress disclosure is always necessary to maintain a project's rating, and in complex projects should extend through the start-up period. During construction, Standard & Poor's expects monthly progress reports prepared by an independent engineer, as well as the construction contractor's own report on the project. Progress reports should detail such items as the percentage completed against the pro forma target, construction budget status, change orders, and a description of work performed, critical issues, and safety measures. A typical complex mining project can take more than two years to achieve design throughputs consistently.

Table 1

Mining Project Issue Ratings

Project	Status	Issuer	Issue	Issue rating
Murrin Murrin nickel laterite project	Start-up	Murrin Murrin Holdings Pty. Ltd.	US$340 million fixed-rate notes, due 2007	B+/Negative/—
			US$80 million floating-rate notes, due 2005	B+/Negative/—
Murrin Murrin nickel laterite project	Start-up	Glencore Nickel Pty. Ltd.	US$300 million fixed-rate notes, due 2014	BB-/Stable/—
Nifty copper project	Operating	Straits (Nifty) Pty. Ltd.	US$32.5 million bank facility, due 2007	BBB/Stable/—
Bulong nickel laterite project	Start-up	Bulong Operations Pty. Ltd.	US$185 million fixed-rate notes, due 2008	Rating withdrawn after default

Unlike publicly traded and owned companies, most projects do not have to publicly disclose financial and operating details. But, without detailed information disclosure to Standard & Poor's, it becomes difficult, if not impossible, to maintain a rating at its initial levels. Simply put, projects that do not disclose or report critical information regularly raise credit risk concerns that could result in a downgrade or withdrawal of the rating.

Moreover, projects that resist disclosing critical operational information, even before they issue debt, risk being given a lower rating than they would get otherwise. Mining projects, in the absence of hedging programs, are always exposed to the risks of price and volume levels that disengage from pro forma financing levels. Hence, Standard & Poor's expects to see detailed operations information for such projects that includes monthly production statistics and realized sale prices, as well as operating costs.

Liquidated Damages Are Not the Same As Cash

Construction cost overruns on major projects are not infrequent and are usually mitigated through contingency liquidated damages, insurance, and debt-service reserves. Construction at Bulong was complete and commodity prices were fully hedged. Like most projects of this nature, BOP was tightly financed, relying on cash flows from operations to meet costs during start-up. Initial problems delayed revenue and quickly depleted available cash reserves. BOP's weak parent company, Preston Resources Ltd., was unable to provide much-needed liquidity during this time. Initial cash shortfalls were met using debt, increasing the cash flow burden on BOP. Later efforts to raise additional equity were unsuccessful. The project's default related to the short-term liquidity crisis rather than to its long-term viability. The project fell into a vicious circle; with revenues delayed, the project was starved of cash, which in turn delayed rectification needed to fix design problems and improve revenue generation.

The delays in construction, commissioning, and start-up on the Murrin Murrin project have meant that it has had to carry significant working capital operating costs and sustain capital costs with limited revenue from production. A significant cash injection by its shareholder to meet project costs was required while waiting on payment of liquidated damages.

The consequences of a delayed completion date are often mitigated by liquidated delay damages, which, for investment-grade projects, typically range from 25% to 50% of the project cost. Liquidated damages provide for fixed daily payments for construction delays beyond the original completion date. These payments are designed primarily to offset additional interest associated with construction financing and other costs, but also to help mitigate lost earnings resulting from the plant's delay. Apart from a portion of liquidated damages covered by a letter of credit, the final settlement of liquidated damages for Murrin Murrin is in arbitration; the project received no cash for the first two years after official completion of construction.

The time leading up to full production or start-up is often underestimated. During this time, construction cash reserves are usually depleted. Unit operating costs are at their highest and least predictable as the operator fine-tunes the plant to the vagaries of the ore body, and the full economies of the plant have not been realized. Unexpected capital expenditures to correct an otherwise unforeseen design fault may be required, and sorely needed cash settlements from construction disputes or insurance are usually slow in being paid, creating a short-term cash need that must be met.

If a contractor's rating does not permit reliance on its ability to pay liquidated damages, a letter of credit in the maximum amount of such damages may be required. Nevertheless, payment issues have been known to arise even with letters of credit, when the bank refuses to honor draws. At Murrin Murrin, the drawdown of funds under a letter of credit were disputed by the construction contractor who claimed that the letter of credit could be drawn only under specific conditions, and these had not been fulfilled. The funds were frozen for weeks while a court ruling was obtained. Payment under insurance policies is usually made after a period of negotiation once a loss has been determined.

Reserve accounts provide some liquidity for specific cash flows such as debt service. A debt-service reserve account is usually funded at the close of financing to cover debt service during construction, and the required debt-service reserve account is traditionally for six months. If the project is delayed, resulting in an extension of the construction contract, the liquidated damages will not be paid. Although debt-service reserve accounts are often sized to cover debt service during construction, the traditional

"rules of thumb" are not replacements for proper evaluation of delay risk. The size of the reserve funds will depend on various factors, including customary standards, the independent engineer's reports, and deal-specific leverage factors. For new or innovative designs, more than the usual six-month debt reserve after construction will be required.

Conversely, provision for an early completion bonus—an incentive for the contractor to stay ahead of schedule—is an advantage for ratings purposes, as it may increase the likelihood that the project will be delivered and accepted early, allowing savings in construction period interest and earlier generation of project revenues.

Commodity Risk Can Be Reduced Through the Financing Structure

Because commodity prices are volatile and hard to predict, the financial structure needs to capture the benefit of high prices while protecting against low prices. A number of recent crashes in commodity prices can be traced back to the unexpected dumping of significant production on the open market. What complicates these analyses is that information about production and consumption in some countries such as China is limited and inaccurate for many commodities, so analysts are not able to predict or determine producer behavior. Therefore, Standard & Poor's gives higher weighting to companies that operate in the lowest-cost quartile for their industry and can cover debt during historical lows for sustainable periods. Commodity risk varies depending on the metal produced, price volatility, and depth of the market, and can be influenced by physical production disruptions.

Having a readily salable product is an advantage. Nifty produces London Metals Exchange (LME)-grade A copper cathode that is readily salable in world markets. In contrast, some copper projects produce concentrate that must first be sold to a smelter, a much smaller intermediate market.

Commodities have different volatilities and need varying levels of flexibility to accommodate the variation in cash available to service debt. Nickel prices have been almost twice as volatile as the Australian dollar exchange rate over the past 20 years and are more volatile than, say, copper prices, while the prices of other commodities such as coal have been less volatile than the currency. A financial structure for nickel, therefore, should accommodate greater variation in revenue than that for a copper project.

The existing financings have used a mixture of term-amortizing debt and cash-preserving mechanisms to reduce this risk. The bank loan for Straits (Nifty) Pty. Ltd. has a fixed repayment schedule set to cover cash operating and capital costs and scheduled debt service at the lowest copper price in recent times, with a sharing mechanism whereby 60% of excess cash is captured, or "swept," and applied to debt reduction. This was acceptable to lenders as a bank loan, but capital market investors prefer predictable cash flow streams. Glencore Nickel Pty. Ltd. adopted an amortizing profile over a long period to reduce annual debt-service commitments. This does not have the flexibility of Nifty's structure in periods of low commodity prices, but provides a predictable cash flow to investors. MMH's structure incorporated a combination of a small component of amortizing debt, a sweep mechanism, and a sinking fund. A sinking fund is established only in the last two years before maturity and is not a default event if not established, so it has minimal effect.

Hedging Is a Double-Edged Sword

"Hedging" is the name given to the financing strategies used to protect or enhance revenue or reduce costs. Hedging is beneficial to the extent that it reduces risk. Hedging that covers exposure to currency, interest rates, and commodity prices can be achieved through a variety of forward sales, futures, and option contracts.

Yet, poorly structured hedging programs can increase the risk of default. In the past year, the sudden drop in the exchange rate has adversely affected many Australian mining companies. Similarly, the rapid rise in gold prices in late September 1999 caused the negative mark-to-market value of Ashanti Goldfields Co. Ltd.'s hedge book to increase suddenly to levels that exceeded Ashanti's margin limits.

Banks sell hedge contracts with a margin-free limit, but if the negative mark-to-market value exceeds the margin-free limit, the lender has the right to call for deposits to cover the exposure. The composition of the hedge portfolio has an enormous influence on how its overall mark-to-market value responds to changes in the underlying commodity price. Ashanti faced acute short-term liquidity because certain contracts in its hedge book unexpectedly landed them with liabilities they could not immediately meet.

Some instruments such as put options protect against price drops. To reduce the costs of purchasing these options, a company may sell call options, but if the price rises unexpectedly, the call option may be in the money, and put options may be well out of the money. Therefore, the use of hedges should be limited to reducing critical business risk such as currency exposure on fixed operating costs and debt service.

In addition, hedging commodities that are not widely traded can be risky. Because some commodities are not widely traded, their markets are subject to manipulation. In these markets, it may not be possible to close a hedge position easily, and a producer may be required to deliver physical product against the contract. This is a large risk for a single-site project that has not begun operations. At a time when the project may not be producing and earning revenue, it will be required to purchase product at market prices—which may be significantly higher than its hedged position—to close out hedges. This is the risk Bulong faced. Similarly, large producers will find it hard to hedge forward a material portion of their output, as doing so will in itself move the market.

Hedging needs to meet production risk. In Bulong's case, hedges had been in place for the first two years of production. Although this reduced commodity price risk during start-up, the project failed to produce and deliver against the hedge contracts.

Standard & Poor's examines a hedging strategy during the analysis of a mining project and assesses the risk of an operational interruption or other adverse event on a project's ability to deliver against its hedges.

Conclusion

Standard & Poor's is already seeing new project finance structures that address the issues raised in this paper. The lessons that can be learned from the mining projects are equally applicable across all types of project financings. As a high-risk investment, it is important to have strong confidence in the design prior to committing to the project, and then to adequately supervise the project through commencement of sustainable operations. The financing structure can be used to reduce commodity risk, but if it incorporates hedges, the hedging strategy must be examined to ensure that it does not increase the risk for the project.

RATING CRITERIA FOR PROJECT DEVELOPERS

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Standard & Poor's uses the criteria described in this article to evaluate the credit risk associated with project developers. A project developer is an entity that invests in various infrastructure projects or infrastructure companies. The term "project developer" has been attributed to entities such as NRG Energy Inc. and Edison Mission Energy Co., which have invested primarily in power projects, and to Hopewell Holdings Ltd. and New World Infrastructure Ltd., which, in addition to investing in power assets, have invested in other infrastructure projects such as toll roads and real estate *(see table 1 for a list of project developers and their respective ratings)*.

A project developer may be any one of the following:

- A closed-end portfolio of infrastructure assets,
- An unregulated generation subsidiary of an integrated utility company, or
- An competitive generation company.

Project developers have diverse strategies. For example, some have a fully integrated strategy in one industry, such as the competitive generation industry. In this case, the developer may have investments in generation, fuel supply, and marketing and trading assets, which are managed as an integrated unit. Other project developers may have more of an investment company strategy, in which the developer has interests in various industries (such as generating assets, real estate, telecommunications, etc.). Project developers that employ this strategy typically operate each investment separately, and no single investment contributes the majority of the revenue and cash flow.

Financing strategies, which are also diverse, range from corporate debt to specific structured debt securities to finance one specific asset or a group of assets. But the same rating methodology is used, whether Standard & Poor's is rating an independent corporate project developer, a corporate utility subsidiary, or a structured, closed-end portfolio.

Rating Methodology

Investment-level risk analysis is the foundation of the project developer credit analysis. The methodology employs a broad four-step process:

1. Determining the weighted-average quality of the cash flow generated by a portfolio of investments;
2. Analyzing the diversification characteristics of the pool of investments for concentration and correlation risks;
3. Examining management's strategy and the ownership structures of the investments and the project developer; and
4. Conducting in-depth financial and sensitivity analyses.

The rating assigned to a project developer is typically an issuer credit rating, which is an opinion of the developer's overall ability to meet its financial obligations, but the rating extends beyond the developer's capacity just to make interest and principal payments on corporate-level debt. The rating can be thought of as a measure of counterparty risk and reflects the company's capacity and willingness to meet *all* of its obligations as they come due. Nonetheless, the rating includes an analysis of the corporate entity's ability to make ongoing interest and principal payments on its corporate debt in addition to being able to repay or refinance any bullet maturities as they come due.

Quality of Cash Flow

The first step in the project developer credit rating process is to assess the quality of cash flow contributed by the developer's investments. This measures the likelihood of whether the investment will distribute cash to the project developer. The evaluation of each investment in a portfolio is critical to the credit assessment because the residual cash flow from each investment (dividends or distributions paid to the developer) provides the means to support project developer-level debt obligations. To assess an investment's cash flow quality, Standard & Poor's analyzes the investment's stability and predictability of cash flow, evaluates the extent to which an investment's cash flow is encumbered by debt and other fixed charges, and finally gauges how covenants and structural features in the financing documents affect the investment's ability to make distributions.

A key foundation in determining the quality of each investment's cash flow is to first establish the ability of that investment to pay its own

obligations, and then to determine the likelihood that the investment will make distributions to the project developer. Although a project's debt rating provides a good starting point in determining cash flow quality, Standard & Poor's also examines the structural features of the financing documents at the investment level. Particular attention is focused on aspects such as dividend restrictions or cash sweeps that protect bondholders at the project level, yet encumber cash flows to the project developer. If the investment is not burdened with debt, Standard & Poor's would determine the economic viability of the investment and the predictability and stability of its cash flow stream.

Standard & Poor's uses a combination of existing corporate and project finance criteria to assess the quality of cash flow for each investment, depending on whether it is a project or a corporate entity. *(See Standard & Poor's "Debt Rating Criteria for Energy, Industrial, and Infrastructure Project Finance," March 19, 2001, and Standard & Poor's 2000 "Corporate Ratings Criteria" for the evaluation of corporate risk.)* In summary, Standard & Poor's makes this assessment by examining both qualitative (nonfinancial) and quantitative factors.

For projects, risk factors include:

- The underlying contractual foundation;
- Sovereign risk;

Table 1

Project Developers

Issuer	Issuer credit rating
AES China Generating Co. Ltd.	BB-/Negative/—
AES Corp. (The)	BB/Positive/—
ANP Funding I LLC	BBB-/Stable/—
Calpine Corp.	BB+/Stable/—
Cheung Kong Infrastructure Holdings Ltd.	A-/Stable/A-1
Cogentrix Energy Inc.	BB+/Stable/—
Edison Mission Energy Co.	BBB-/Stable/—
Edison Mission Energy Funding Corp.	BBB/Stable/—
Edison Mission Midwest Holdings Co.	BBB/Stable/A-3
Hero Asia (BVI) Co. Ltd.	BBB-/Stable/— (Foreign currency only)
Hopewell Holdings Ltd.	BB-/Negative/—
International Power PLC	BB/Stable/—
Kenetech Corp.	D/—/—
MidAmerican Energy Holdings Co.	BBB-/Stable/—
Mirant Corp.	BBB-/Stable/A-3
Mirant Americas Generation Inc.	BBB-/Stable/—
New World Infrastructure Ltd.	BBB-/Stable/—
NRG Energy Inc.	BBB-/Stable/—
NRG Northeast Generating LLC	BBB-/Stable/—
NRG South Central Generating LLC	BBB-/Stable/—
PG&E Generating Co. LLC	BBB/Stable/A-2
PG&E National Energy Group Inc.	BBB/Stable/—
Reliant Energy Mid-Atlantic Power Holdings LLC	BBB+/Stable/—
Reliant Resources Inc.	BBB+/Stable/—
Road King Infrastructure Ltd.	BB+/Stable/—
USGen New England Inc.	BBB/Stable/A-2

- Technology, construction, and operations;
- Competitive market exposure;
- Business and legal structures;
- Financial strength; and
- Counterparty risk.

Typically, the host country's foreign currency rating limits a project's debt rating potential, especially for largely nonexportable products such as electricity, and the cash flow quality may reflect such a cap. Typically, project ratings will be lower than the sovereign's foreign currency rating. Institutional business and legal development issues such as corporate governance, status of commercial and contract culture, and pervasiveness of corruption, among other topics also influence cash flow quality. Force majeure risk is also evaluated for the project, as well as any credit distribution enhancements, such as insurance policies that guarantee distributions in the event of currency convertibility or transferability problems. *(See the related commentary titled, "Project Finance Summary Debt Rating Criteria," on page 19 for further details.)*

Table 2

Residual Cash Flow Ratings and Quality of Cash Flow Scores

Residual cash flow rating	Quality score
Highly predictable	1, 2
Somewhat predictable	3, 4
Somewhat uncertain	5, 6, 7
Highly uncertain	8, 9, 10

Table 3

Characteristics of Quality of Cash Flow Scores

Scores	Characteristics
1, 2	High predictability of cash flow, such as a FERC-regulated pipeline with 100% of the capacity under long-term contracts with counterparties rated in the 'A' category.
	High probability of receipt of cash distributions at the project developer level.
	No restrictive covenants in the indenture that limits cash distributions.
3, 4	High degree of stability of cash flows, such as a qualifying facility project with 100% of its revenues under contract.
	Moderate debt leverage.
	Restrictive covenant that limits cash distribution; however, project has a high likelihood of achieving the distribution profit threshold.
5, 6, 7	Moderate stability and predictability of cash flow; some volatility, such as a merchant power facility with adequate financial cushion under Standard & Poor's net revenue analysis for entity with investment-grade rating.
	Moderate debt leverage.
	Restrictive covenant for cash distributions.
8, 9, 10	Highly uncertain cash flows; high volatility of cash flows to project developer.
	Power project in the emerging markets.
	Overleveraged project in the U.S. where expected coverages are low.

For assets with merchant electricity exposure, Standard & Poor's uses its net revenue analysis methodology to determine the quality of cash flow for these investments *(see Standard & Poor's "Net Revenue Analysis of Merchant Power Economics," published on Sept. 28, 2000)*. Generally, net revenue analysis uses the hypothesis that generating stations in a competitive market will, in the long run, earn no more than the lowest-cost, most efficient new entrant in the system. An adequate financial cushion after paying all fixed obligations, including debt service, is required to weather lower pricing scenarios that may exist during bust cycles. Boom cycles, however, typically are not incorporated in the analysis because excess profits are considered upside for equity investors.

For corporate entities, Standard & Poor's examines both qualitative and quantitative factors to assess cash flow quality. Qualitative factors determine a corporate entity's business position. The analysis is a fundamental business analysis with a focus on the company's competitive position and covers regulation, markets, technology, efficiency, competition, and operations. Quantitative measures determine the corporate entity's financial position and include the financial policy, profitability, cash flow protection, capital structure, and financial flexibility. The results of this analysis can vary widely because, for example, cash flow from an investment with a fixed-price, long-term power purchase agreement or from an investment in a regulated utility in a developed country is likely to be much less variable than cash flow from a commodity-based project in a developing country.

Standard & Poor's assigns a cash flow quality score typically to investments that make up 80% to 90% of the overall developer-level cash flow. Standard & Poor's uses a scale of 1 to 10 (with 1 being the highest certainty and 10 being the lowest) to quantify relative cash flow quality. Table 2 displays scores for quality of cash flow as they relate to Standard & Poor's assessment of cash flow predictability. Table 3 gives examples of investments with different cash flow quality scores.

After assessing cash flow quality of the investments in the developer's portfolio, the next step

is determining the portfolio's weighted-average quality of cash flow. Standard & Poor's calculates this based on the size of the expected cash flows from each investment. Because most project developers issue debt with bullet maturities and therefore have inherent refinancing risk, the weighted-average quality of cash flow is computed over a long-term horizon (10 years) to evaluate the project developer's ability to refinance its corporate-level debt. Standard & Poor's assesses a developer's access to various capital markets based on management's willingness and accessibility to tap the debt and equity markets. In general, a company's experience with varying financial instruments and capital markets gives management alternatives if a particular financing vehicle is no longer available.

Portfolio Characteristics

Although the foundation of a project developer's credit strength rests with the ability of its investments to generate cash distributions, the overall credit strength stems from the specific portfolio's diversification characteristics. The credit strength of a pool of diversified assets will generally be stronger than the credit strength of any individual investment or a small group of investments because pooled cash flows diversify default risk.

Standard & Poor's assesses diversification by testing the portfolio for concentration and correlation risks to determine how diverse the portfolio's cash flow stream is likely to be and how these cash flows may be hampered if a specific event occurs. This analysis weighs heavily on the rating outcome because the financial ratios used *(outlined under the "Financial Analysis" section on page 55)* assume the portfolio exhibits some diversification. This being the case, Standard & Poor's adjusts the portfolio's weighted-average quality of cash flow assessment downward, or adjusts the cash flow stream downward ("diversification penalty") if the portfolio is deemed to lack diversification.

Concentration and correlation analyses are applied on a case-by-case basis. Concentration in a portfolio will obviously limit any diversification benefits. For example, if payment of project developer-level debt is highly dependent on the performance of a small number of investments, the diversification effects will be negligible. When a portfolio is highly concentrated, the developer's rating will be dependent more on the cash flow quality of the investments deemed to cause concentration than on the financial ratio analysis at the project developer level. An example of high concentration is a group of merchant generating assets that all use the same technology and the same fuel, are all under construction, and are all located in one or two markets. A portfolio with these characteristics will likely be penalized for lack of diversity.

Another example is a project developer that has a large percentage of its cash flow dominated by investments in an emerging market that generate highly uncertain cash flows. For instance, consider a developer that relies on 50% of its cash flow from 10 projects (all in the Philippines) with a quality of cash flow score of 10, and 50% of its cash flow from five projects elsewhere with a quality score of 2, to give a weighted-average quality of cash flow score of 7. Consider further that based on the company's base case financial projections, the cash flow coverage ratio averages more than 4 times (x). According to Standard & Poor's financial benchmarks *(discussed below)*, the rating would be 'BBB'. But, it cannot be stressed enough that the financial benchmarks assume the portfolio has some diversity. Because of the lack of diversity in this example, and the fact that a strong likelihood exists that the project developer will receive zero cash flow from the Philippines in certain years, the developer's rating will be penalized for the concentration risk inherent in this portfolio. Standard & Poor's would perform a scenario analysis of the cash flow coverages without the benefit of any cash flow from the Philippine projects, and a scenario with less cash flow contributed from the Philippines than the base case shows.

Table 4

Comparison of Concentration and Correlation

High concentration and correlation	Low concentration and correlation
Total cash flows are reliant on a small number of projects (two or three).	Total cash flows are reliant on a large number of projects four or more.
A large portion of the portfolio cash flows will react similarly to economic cycles or for any other reasons.	A large portion of the portfolio cash flows will not react similarly to economic cycles or for any other reasons.

Similarly, diversification benefits are limited by having high correlation. In analyzing correlation, Standard & Poor's determines the extent to which a large portion of a portfolio's assets can be affected by related circumstances. For example, if a project developer's portfolio is made up of 20 power projects, all located in Brazil, Standard & Poor's may determine that the portfolio exhibits high correlation due to the overreliance on Brazilian factors. On the other hand, if a portfolio is made up of different types of projects (pipelines, generating facilities, distribution companies, etc.) in a number of countries, Standard & Poor's would be more likely to conclude that correlation risk is low. In addition to qualitative analysis, any correlation patterns exhibited in a portfolio's historical cash flows are measured quantitatively and assessed. Because a project developer's portfolio does not typically have a large number of investments and is usually made up of infrastructure investments, some correlation is expected. For portfolios lacking correlation, the diversification benefits may exist and lead to a higher rating (all else being equal). Conversely, if a portfolio exhibits high correlation, Standard & Poor's would likely penalize the project developer's credit rating.

Management and Ownership Strategies

Management plays a vital role in Standard & Poor's analytical process of rating project developers because management's strategies and decisions are the key elements in determining a developer's future and credit strength. Management is evaluated for its role in determining the firm's overall operational success, financial track record, and risk tolerance. Standard & Poor's looks for evidence of management's willingness to achieve and commitment to maintaining credit quality from past actions and from a sound, articulated long-term strategy.

Standard & Poor's focuses on senior management's record of enhancing a firm's financial condition using various discretionary actions such as the sale of common equity, common dividend practices, and debt repayment. The assessment of a firm's senior management is ascertained through meetings, conversations, and review of company plans. The meeting with management is used to augment the public record and to discuss the project developer's strategic plans and investment policies. The key test, however, remains management's ability to achieve performance consistent with its strategic plans.

Another key aspect of the management evaluation is the assessment of financing and structural strategies that may lead Standard & Poor's to consolidate certain investments for analytical purposes, even if the investments are financed on a stand-alone, nonrecourse basis. The objective of this evaluation is to determine how much linkage exists between the project developer and each investment or between investments within the group. This determination depends on many factors. First, Standard & Poor's analyzes the ownership and strategic importance of the investments, determines how much of the overall cash flow is contributed by the investments, and makes a judgment about whether the investments would likely be consolidated if the project developer declares bankruptcy. Then, Standard & Poor's determines whether an investment supports the activities or business of other parts of the family. Finally, Standard & Poor's forms an opinion about whether the project developer would lend short-term support to the investment in times of stress to preserve overall shareholder value. Once these factors have been analyzed, Standard & Poor's will determine which investments, if any, will be consolidated at the project developer level and will consolidate a certain amount of the debt and cash flow of these investments based on its analytical judgment. In these cases, Standard & Poor's assumes that all structure collapses.

For example, a project developer has ownership interests in 20 investments. Two investments contribute 70% of the cash flow and are structured as subholding companies with many unleveraged assets. In addition, the two investments carry a large portion of the consolidated debt (for instance, 80%). Assume further that the two investments are financed on a nonrecourse basis; however, they are also 100% owned and controlled by the project developer and are not structured as bankruptcy-remote, special-purpose entities. One other key factor is that these investments benefit from affiliate relationships within the group. For instance, suppose the assets are generating stations and benefit from fuel procurement and energy marketing from an affiliate. Because of the facts in this example, Standard & Poor's would consolidate 100% of the debt and 100% of the cash flow from these two investments at the project developer level. The quality of cash flow score for these investments, once consolidated, would

improve because Standard & Poor's would view cash for analytical purposes as fungible between the entities. Standard & Poor's view would be that the investors at the subholding company are equally exposed to the project developer's credit risk because of the integration of operations and affiliate relationships. Standard & Poor's considers large portfolio financings at subholding companies to be financing strategies for what would ordinarily be corporate (project developer-level) debt.

Standard & Poor's also is interested in the project developer's strategies for refining its portfolio of investments. Is the developer a passive or active investor? In either case, how are the investments structured and financed? What is the time horizon for each investment? Management should have a well-conceived plan for investing in projects and for determining appropriate project ownership structures. Not only are the initial investing strategies critical, but the developer's ongoing cash flow management and exit strategies are of equal importance. These issues demonstrate the project developer's commitment to each investment, capacity to upstream residual cash flows, and willingness to make further financial commitments to a specific investment.

Credit for parental ownership. When a project developer is part of a larger corporate family, Standard & Poor's determines how much, if any, support from the parent company should be incorporated in the project developer's credit rating. Standard & Poor's weighs the strength of the economic incentives, strategic importance, and other ties that could bind a parent company to its project developer subsidiary and investments against the insulation factors that exist to keep the developer or its investments structurally at greater-than-arm's-length away from the parent company. The results of this analysis determine whether Standard & Poor's should elevate, maintain, or cap a project developer's stand-alone rating. For U.S. markets, this factor was important before electricity deregulation because large electric utility companies owned many of the project developers. More recently, however, Standard & Poor's has seen many of these subsidiaries get spun off from the parent to increase shareholder value. As this trend continues, credit for parental ownership will likely become less relevant.

To gauge the level of parental support, Standard & Poor's analyzes the linkage between a parent and the project developer. Because a corporation's primary obligation is to serve the interests of its shareholders, if a parent company has invested large sums of cash (shareholder or bondholder funds) at the project developer level, management may feel more compelled to support the project developer in stressful situations.

When considering how much parental support should be factored into the project developer's rating, the strategic importance of the developer and of its investments to the corporation as a whole are also analyzed. If the developer has substantial size and is the principal vehicle within the organization to increase future earnings, greater parental support would be factored into the rating.

Moral obligations, political influences, and management's stated posture also could bind a parent to lend support to its project developer subsidiary and potentially enhance the rating. Moral obligations often come from the need to keep lenders happy so the capital markets will be responsive to future capital investments.

Financial Analysis

Once Standard & Poor's has established the portfolio's quality of cash flow, taking into account concentration and correlation, and has determined which investments will be consolidated for analytical purposes, the process then

Table 5

Partial Consolidated Cash Flow/Interest OR Parent-Only Cash Flow/ Recourse Interest Ratios, by Rating

Quality of cash flow score	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+, BB	BB-, B+	B, B-
1, 2	3.1-3.9	2.7-3.5	2.4-3.1	2.0-2.7	1.7-2.3	1.4-2.0	1.1-1.7	0.7-1.3	N.M.	N.M.
3. 4	4.5-5.1	4.1-4.7	3.7-4.3	3.3-3.9	2.9-3.6	2.6-3.3	2.3-2.9	1.8-2.4	1.3-1.8	0.7-1.1
5, 6, 7	5.4-8.4	5.0-6.0	4.6-6.5	4.2-5.5	3.8-4.7	3.5-4.1	3.2-3.6	2.7-3.0	2.1-2.3	1.3-1.5
8, 9, 10	N.M.	N.M.	7.7-10.5	6.4-9.2	5.4-8.0	4.5-6.9	3.8-5.8	3.1-4.7	2.4-3.6	1.7-2.5

N.M.—Not meaningful.

moves to conducting a detailed financial analysis of the project developer to determine its ability to service all of its obligations, given the cash flow expected from its investments. A principal element in evaluating a project developer's financial strength is determining the developer's ability to withstand numerous threats (financial and otherwise) to its capacity to generate stable and predictable cash flows. This is most easily done through the use of scenario analysis. When performing the financial analysis, the key areas examined are cash flow, capital structure, financial policy, and financial flexibility. Financial ratio analysis allows Standard & Poor's to analyze trends from one year to the next and to compare one project developer to another.

Cash flow. Cash is needed to service a project developer's interest and principal obligations; reported earnings, a measure frequently reported by publicly traded developers, do not always equate to available cash flow. Standard & Poor's defines cash flow as funds from operations. Relevant cash flow ratios are cash flow to interest, and cash flow to debt service (principal and interest). Because most project developer-level debt can be characterized as bullet maturities, Standard & Poor's focuses the analysis on cash flow to interest.

One of the main considerations in calculating this ratio is which investments are consolidated. If no investments are consolidated, the ratio would be cash distributed from investments to recourse interest. Otherwise, the ratio would be calculated on a fully consolidated basis or on a partial consolidated basis. A project developer having less predictable cash flow will require stronger cash flow interest coverage than a developer with the same rating that has more predictable cash flow. Table 5 shows the relationship between financial risk (the most important being cash flow to interest) and the quality of cash flow. It should be emphasized that this table should be used as guidance and is not meant to be a precise indicator of the project developer rating. Rather, the ratios presented are meant to convey ranges that characterize levels of credit quality. Obviously, strengths shown in one financial or other measurement may be offset by weaknesses in another.

Other cash flow ratios Standard & Poor's computes, analyzes, and uses for comparison purposes are cash flow to recourse debt, and

Table 6

Partial Consolidated Cash Flow/Total Debt Interest OR Parent-Only Cash Flow/ Recourse Debt Ratios, by Rating

Quality of cash flow score	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+, BB	BB-, B+	B, B-
1, 2	20.0-25.0	17.5-22.0	15.5-19.5	13.5-17.0	11.5-15.0	9.5-13.5	8.0-11.5	6.0-9.0	N.M.	N.M.
3, 4	31.5-36.5	27.5-32.0	24.0-28.5	21.0-25.5	19.0-23.0	17.0-21.0	15.0-19.0	12.5-15.5	9.5-12.0	6.0-8.0
5, 6, 7	40.0-56.0	35.0-50.0	31.0-44.0	28.0-38.5	26.0-34.0	24.0-30.0	22.0-26.5	19.0-22.0	15.0-17.0	9.5-11.5
8, 9, 10	N.M.	N.M.	51.5-74.0	45.5-64.5	39.5-56.0	34.5-49.0	29.5-42.5	24.0-35.5	18.5-28.0	13.0-19.5

N.M.—Not meaningful.

Table 7

Total Debt/Total Capitalization OR Recourse Debt/ Adjusted Capitalization Ratios, by Rating

Quality of cash flow score	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+, BB	BB-, B+	B, B-
1, 2	46.5-50.5	49.5-53.5	52.5-56.5	55.5-59.5	58.0-62.0	60.5-64.5	62.5-66.5	65.0-69.0	N.M.	N.M.
3, 4	37.5-42.0	41.5-46.0	45.0-49.0	48.5-52.0	51.0-54.4	53.0-57.0	55.0-59.5	59.0-63.0	64.0-67.0	70.5-72.0
5, 6, 7	30.5-37.5	35.5-40.0	44.0-43.0	43.5-46.0	46.5-48.5	49.0-51.0	51.0-53.0	54.5-57.0	59.5-62.5	66.0-69.0
8, 9, 10	N.M.	N.M.	27.5-37.5	31.5-41.5	34.5-44.5	37.0-47.5	39.0-50.0	42.5-53.5	46.0-58.0	51.0-64.0

N.M.—Not meaningful.

cash flow to total debt. Table 6 presents Standard & Poor's guidance for these ratios.

Because project developer-level debt usually has bullet maturities, the cash flow analysis also must evaluate the certainty of cash flow distributions after the bullet maturity dates to gauge the developer's ability to repay or refinance these obligations at maturity.

Capital structure. The second aspect of the financial analysis is the capitalization and the debt within the capital structure. Total debt to total capitalization and recourse debt to adjusted capitalization (adjusted capitalization equals total capitalization minus nonrecourse debt) are the principal ratios analyzed. Nonrecourse debt is subtracted only to the extent that Standard & Poor's believes the project developer will not support the investment in the short term. Standard & Poor's examines the debt component for risk factors such as reliance on short-term, unhedged debt or simultaneous bullet maturities on a large portion of the outstanding debt. The company's quality of cash flow is again critical in determining the appropriate amount of leverage; strong cash flow quality may support a high use of debt financing. The balance sheet analysis includes an assessment of the company's recourse and nonrecourse debt. This enables Standard & Poor's to analyze the developer's debt tolerance, given the quality of its investment cash flows. Table 7 presents guidance for the capital structure ratios that may be expected for various weighted-average quality of cash flow assessments.

In addition, Standard & Poor's examines the use of unhedged floating-rate debt or aggressive balance sheet funding of project construction before financial close of the nonrecourse project financing. Off-balance-sheet obligations and contingent liabilities, such as lease payments, performance guarantees, or tolling arrangement payments, are analyzed to determine the likelihood of their realization and the potential adverse effect they would have on a project developer's capital structure.

The need for capital. For capital-intensive firms and growth companies such as project developers, it is critical to analyze the expected capital requirements and compare that to both internally generated cash flow and to the developer's ability to finance its capital requirements externally. Standard & Poor's examines the developer's needs for both working capital and fixed capital, focusing particularly on the developer's working capital management techniques and flexibility to alter the timing of large capital expenditures. Again, the quality of cash flow and ability to finance its capital requirements internally are key in this analysis. Capital market access is an important factor as well; however, markets can disappear very quickly at inopportune times.

Another aspect of capital needs is the developer's appetite for acquisitions and expansions. Expansions can normally be deferred, and a company may have discretion to alter the timing of the investment. On the other hand, if a company uses acquisitions as a means for growth, this must be reflected in the analysis. Management's experience with acquisitions provides a basis for judging prospects for future acquisitions.

Financial flexibility. Standard & Poor's financial analysis also includes a review of a project developer's financial flexibility. Operational needs can be substantial, and liquidity is very important to making future investments and repaying bullet maturities as they come due. Thus, adequate lines of credit, unrestricted cash availability, debt maturity schedules, and reliance on external markets are analyzed with respect to the developer's financing plans and needs. Here, financial policies are analyzed with a focus on their level of conservatism. Financial policies, which include accounting procedures, common dividend practices, capital repatriation methodologies, currency hedging implementation, and reliance on floating rate debt, are examined to determine whether they add risk to the firm's profile. Standard & Poor's also assesses a company's capacity and willingness to issue common equity. To the extent that the project developer is a subsidiary of a large, well-capitalized company, Standard & Poor's determines whether the relationship can provide any liquidity benefit to the developer.

Flexibility can be jeopardized if a company is overly reliant on bank borrowings or commercial paper. Reliance on commercial paper without having adequate backup facilities is viewed negatively when assessing financial flexibility. An unusually short-term maturity schedule for long-lived assets is also a negative.

Conclusion

Standard & Poor's focuses on the qualitative and quantitative issues surrounding a project developer, as it would when rating any corporation. But, because a project developer usually has varying structural limitations at both the

corporate and investment levels, Standard & Poor's employs a hybrid approach to rating these types of entities, encompassing aspects of corporate, structured, and project finance criteria. The process outlined in this article provides the framework for credit analysis and promotes consistency and clarity in assigning ratings on project developers. Standard & Poor's also recognizes that a developer's portfolio is not intended to be static and can change dramatically overnight. Therefore, management's previous actions and any demonstrated parental support are key components in determining a project developer's final debt rating.

Using Net Revenue Analysis to Assess Power Generation Exposure to Market Risk

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Standard & Poor's uses net revenue analysis to evaluate how susceptible power generation assets are to market risk in competitive markets. Power generating assets can be fixed, physical plants or can be financial assets such as tolling arrangements or power purchase agreements. The analysis is used to measure a generating asset's exposure to market risk compared against Standard & Poor's benchmark new market entrant, assuming power markets will move to equilibrium in the long term. The analysis is used regardless of whether the generating asset is financed on a stand-alone project finance basis, as part of a portfolio of assets, or as part of a competitive generating company.

The conceptual framework for net revenue analysis can be found in *"Net Revenue Analysis of Merchant Power Economics,"* published on Sept. 28, 2000. Net revenue analysis uses the hypothesis that generating assets in a market will earn no more than the new entrant in that market. Prices may be high for short periods, but, over the long term, will be driven down to an equal level by new market entrants.

In determining a generating asset's exposure to market risk, Standard & Poor's calculates a financial cushion that measures an asset's ability to withstand market downturns. An adequate financial cushion is required to weather market downturns during bust cycles. The financial cushion is calculated by subtracting fixed costs and debt service from expected net revenue, measured in dollars per kilowatt year ($/kW-yr) *(see figure 1)*. The financial cushion, as with other financial benchmarks, is evaluated along with other risks or mitigating factors, such as the regulatory environment, legal structure, fuel supply risk, technical risk, or portfolio diversification *(see Standard & Poor's "Merchant Power: Project Finance Criteria," published December 1999)*.

This article focuses on the application and interpretation of the net revenue analysis for U.S. markets and is organized in four sections:

- Why net revenue is an appropriate benchmarking tool for measuring market risk,
- Expected net revenue analysis assumptions,
- How Standard & Poor's applies net revenue analysis to generating assets, and
- An appropriate financial cushion.

Although net revenue analysis is most easily applied to combined cycle natural gas-fired turbine (CCGT) and gas turbine peaking units, it generally can be applied to all types of units in a market. The analysis, understandably, becomes more complicated when applied to hydro or other renewable resource assets. Net revenue analysis in principal is applicable to any competitive power market. Hence, Standard & Poor's expects to apply this analysis globally to markets that have introduced competition or that expect to do so in the foreseeable future.

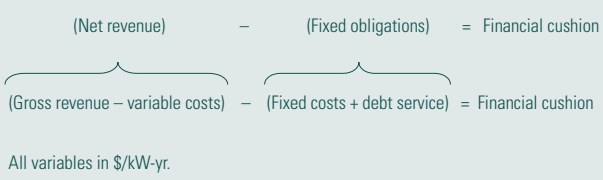
Why Net Revenue Is an Appropriate Measure of Market Risk

Traditionally, utility analysts have used the merit dispatch curve to determine a plant's competitiveness. The merit dispatch curve orders gross generation capacity in a region by each unit's variable costs from lowest to highest. Those lowest on the merit curve are most likely to dispatch and will, therefore, generate more revenue than plants with higher variable costs. Such an approach, which focuses mostly on variable costs and expected gross revenues, ignores other factors that influence credit, including fixed costs and debt-service obligations. Even if a base load merchant plant generates the maximum possible revenue by running nonstop year 'round, high fixed costs and debt-service obligations could still undermine the unit's financial viability. In fact, if fixed costs and debt-service obligations are high enough, a base load unit would at some point have the same (or even worse) financial viability as an intermediate-load unit or a peaking unit.

The net revenue analysis compares generating assets on a consistent basis by forecasting a merchant plant's expected long-term annual net revenue. A merchant plant with a low variable-cost profile will have a higher forecasted net revenue than a plant with a high variable-cost profile. A financial cushion is then calculated by subtracting annual fixed costs and debt-service obligations from the forecasted net revenue. Two plants with similar financial cushions would be expected to have similar exposures to market risk, even though one may be a base load unit and the other an intermediate unit.

The financial cushion (calculated in $/kW-yr) measures a generating asset's ability to withstand an absolute drop in net revenue and still cover all its costs and debt service on a one-time basis, as opposed to a percentage drop in gross revenue or a discount to break even. Net revenue analysis distinguishes itself from other market analyses by measuring absolute net revenue volatility, which allows consistent comparisons across different generation technologies. This approach incorporates the fact that if a peaking unit's net revenue drops by a certain amount, say $20/kW-yr, the net revenue of a base load plant in the same market will also drop by $20/kW-yr. Even though the drop for the peaking plant is much larger as a percentage due to its smaller revenue base, the base load plant could be more at risk if its fixed costs and debt-service obligations are high relative to the revenue potential (not received). The financial cushion helps analyze this interaction between revenue received from the market and a generation facility's cost profile.

Figure 1



Standard & Poor's Expected Net Revenue Analysis Assumptions

For U.S. markets, Standard & Poor's determines a generating asset's expected net revenue by comparing the asset's key characteristics against those of two benchmark new entrants that reflect Standard & Poor's expectations of long-term capital cost and efficiency developments in power generation. Based on our research of the existing regional markets, Standard & Poor's concluded that given today's fuel prices, the market-clearing technologies for most U.S. power markets will be the simple cycle combustion turbine (CT) and the combined cycle natural gas-fired turbine (CCGT).

Because new entrants will enter a market in response to profit opportunities, their net revenue requirements will cap the long-term net revenue available to other market participants. New entrants will continue to enter a market until equilibrium profit levels are achieved. Table 1 shows the costs and operating characteristics of Standard & Poor's benchmark CT and CCGT technologies. Standard & Poor's recognizes that relative fuel costs and changes in technology will determine the new entrant's technology. If relative fuel prices or relative technological advances change significantly, the mix of power generation will adjust.

The net revenue of any given unit is forecasted by measuring the size of the area between the price duration curve and the unit's variable cost line. The price duration curve, such as the one shown in figure 2, reflects Standard & Poor's view of market price. Every unit in a market is measured against the same price duration curve. A unit with lower variable cost line will have a larger area between the price duration curve and the variable cost line. This is consistent with the expectation that a unit with low variable costs would have a high forecasted net revenue.

The shape of the curve is driven primarily by the new entrant economics of the benchmark CT unit and the benchmark CCGT. Because Standard & Poor's expects a new entrant CT's net revenue requirement to be $50/kW-yr, the area between the price duration curve and the CT variable cost line is expected to average to about $50/kW-yr. The net revenue requirement for a new entrant CCGT is estimated to be about $71/kW-yr. Consequently, the area between the price duration curve and CCGT

Table 1

Standard & Poor's Benchmark Assumptions (based on 2000 prices)

	CT	CCGT
Capital cost	$340/kW	$525/kW
Financial leverage	40% debt	55% debt
Interest rate	8.0%	8.0%
After-tax equity return	14%	14%
Tax rate	40%	40%
Capital recovery period	25 years	25 years
Fixed operating cost	$5/kW-yr	$11/kW-yr
Heat rate	11,000 BTU/kWh	7,100 BTU/kWh
Variable operating & maintenance costs	$13/MWh	$1/MWh
Fuel costs	$3/mmBTU for natural gas; $4/mmBTU for No. 2 fuel oil (uses 50% each)	$3/mmBTU for natural gas
Long-term normalized net revenue requirement	$50/kW-yr	$71/kW-yr

MWh—Megawatt hour.

variable cost line is expected average to $71/kW-yr in the long run. The area below the CCGT's variable cost line is expected to be about $160/kW-yr, which is estimated based on the expected annual variable cost of the benchmark CCGT unit, but discounted to account for merit order dispatch realities and gas price volatility. *(See figure 2 for the graphical representation of each area.)*

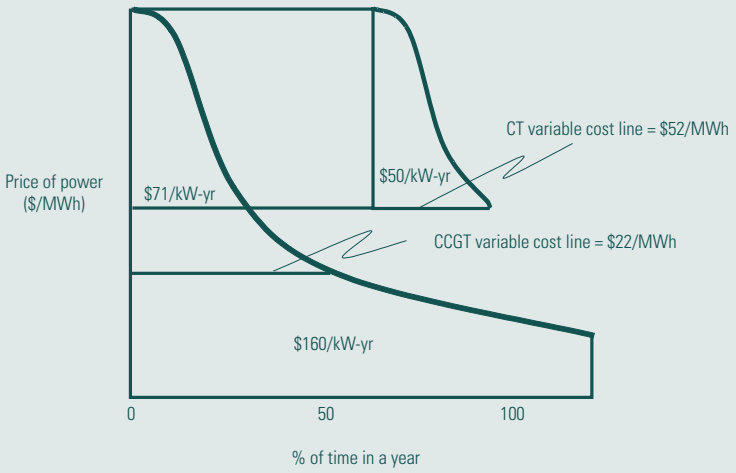
The assumptions for the net revenue requirement of the benchmark CT unit and the benchmark CCGT units are shown in table 1. These assumptions are based on extensive research by Standard & Poor's that included observations of new entrants' behavior, tolling agreement pricing, and interviews with various developers, power marketers, engineers, and construction contractors of power plants. For conservatism, we have used the lowest third of the sample collected.

The process that led Standard & Poor's to determine the size of the area below the CCGT's variable cost line can be explained in the following way: In a scenario in which gas is on the margin 100% of the time, the area below the CCGT variable cost line represents the total annual variable cost of the CCGT, which amounts to $187/kW-yr. The calculation is based on $3/mmBTU for natural gas and 7,100 BTU/kWh heat rate: $3/mmBTU x 7,100 BTU/kWh x 8,760 hours = $187/kW-yr.

But, the amount is likely to be less than $187/kW-yr because units that are not natural gas-fired set the price for many hours of the year in most markets. For example, during off-peak periods, depreciated coal or nuclear units set the price in many markets. The price of power for these units are lower than for gas plants. Moreover, most power plants built in the U.S., including many coal and nuclear units, are still in operation and are not likely to be retired anytime soon. Newly added capacities tend to capture only incremental load growth rather than displace existing plants that are less economical. Even in markets where natural gas sets the marginal price for much of the year, lower natural gas prices, which may not be correlated with other fuels (e.g., coal, nuclear, and hydro power generation), will shrink base load margins.

Based on actual observation of the amounts available in current regional markets and to account for the two possibilities described above, Standard & Poor's has determined that a $160/kW-yr estimate for the area below the CCGT variable cost line is reasonable. Part of the analysis is to determine the extent to which a market may fail to achieve or exceed the $160/kW-yr benchmark. Power market studies, which Standard & Poor's will consider in rating new financings, are valuable in this respect because they model the existing generation

Figure 2
Price Duration Curve and Net Revenue Assumptions



resource base and help determine how specific units may behave in the market.

The expected net revenues for other generating units will be equal to, higher than, or lower than the expected net revenues of the benchmark units, depending on the variable-cost profile and operational characteristics of the generating units compared against the benchmarks'. For example, net revenue will differ in the following manner:

- If a given unit has the same variable costs and operating characteristics as the benchmark CT or CCGT, the unit will also be assigned net revenue of $50/kW-yr or $71/kW-yr, respectively;
- If the unit has higher variable costs than the benchmark CT, the unit will still be assigned net revenue of $50/kW-yr. This amount reflects the value of the peaking capacity mainly as insurance against unexpected supply shortages;
- If the unit has variable costs between those of the CT and the CCGT, the unit will be assigned net revenue between $50/kW-yr (expected for the benchmark CT) and $71/kW-yr (expected for the benchmark CCGT); and
- A unit with variable costs lower than those of the benchmark CCGT will be assigned net revenue greater than $71/kW-yr.

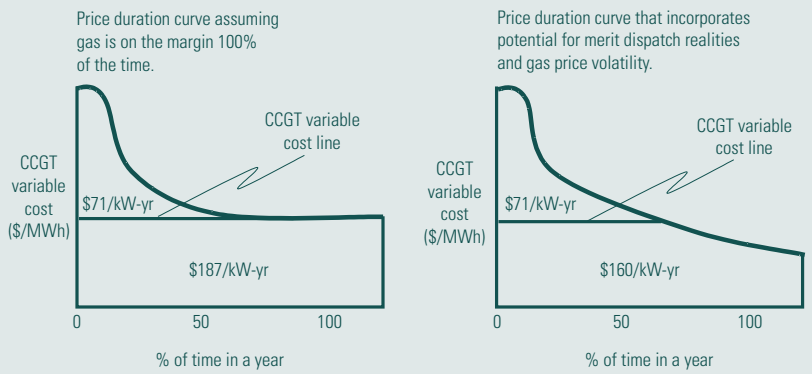
The variable costs of any given unit should be calculated the same way as the benchmarks' variable costs. Standard & Poor's uses the same assumptions for fuel costs and analyzes each unit's heat rate parameters and variable operating & maintenance (O&M) costs on a case-by-case basis. Table 2, which helps expedite the net revenue analysis, provides the expected net revenue that corresponds to different variable-cost levels. The first column shows variable-cost levels, and the second column provides the corresponding net revenue.

Gas price assumption. Based on today's fuel prices, Standard & Poor's expects that natural gas-fired CCGTs will be the market-clearing technology used for the foreseeable future for most U.S. power markets. Consequently, natural gas prices will directly influence electricity prices. For purposes of the net revenue analysis, Standard & Poor's uses a natural gas price deck of $3 per million BTU (mmBTU), in 2000 dollars, which is consistent with our price forecast used to analyze exploration and production companies.

If long-term trends indicate higher natural gas prices, the expected price of electricity in most markets should also increase. Higher electricity prices will not benefit the net revenue for gas-fired units because every gas unit would be burning the higher-priced natural gas. Units that burn other fuels may also benefit from the higher electricity prices (i.e., have higher net revenues) unless their fuel prices also rise. Conversely, if long-term natural gas prices decrease and electricity prices decline, the natural gas-fired units would be neutral because their margins should remain the same. Lower natural gas prices will, however, affect units that burn other fuels (e.g., coal) more because the entire amount of gross revenue available to the market will shrink. Therefore, assets that burn fuels other than gas may experience shrinking margins or net revenue.

Accounting for operational limitations. An underlying assumption of the net revenue analysis is that a unit will dispatch whenever the market price rises above the unit's variable costs. Nonetheless, various operating constraints may limit a unit's ability to attain the entire expected net revenue. Some generating units cannot start and stop quickly. Consequently, they may not be able to capture a positive margin when power prices rise quickly above their variable costs, or may suffer a period of negative margins if prices drop quickly below variable costs. As a result, these types of units will generate lower net revenues than their variable-cost level suggests, so Standard & Poor's discounts their expected net revenues. This determination is made on a case-by-case basis.

Figure 3
Price Duration Curves for Gas-Fired Plants



Due to low variable costs, most steam-coal plants and all nuclear plants operate as base load units. But, these facilities also may not be able to capture the full net revenues available in a given year because the units typically are not available (operational) for 100% of the hours in a year due to scheduled maintenance outages or forced outages for some period. Operators recognize this limitation and typically schedule maintenance outages at times when electricity prices are lowest.

To adjust for normal, scheduled outages and limited forced outages of base load units, Standard & Poor's reduces the expected net revenue to account for periods of unavailability. The third column in table 2, "Discount for each % availability below 100%," shows the amount by which expected net revenue is reduced for a given generating unit to account for outage hours.

For example, if a base load unit has no variable costs, the second column in table 2 shows that the unit would earn $231/kW-yr. To earn the full amount, the facility would need to operate all 8,760 hours of the year. To account for availability below 100%, according to the third column, the net revenue would be reduced by $1.60/kW-yr for each percentage below 100% availability. Therefore, if Standard & Poor's expects a base load unit with no variable costs to have an availability of 90% (10% below 100% availability), the unit's net revenue would be reduced to $215/kW-yr ($231/kW-yr minus $1.60/kW-yr times 10), which is shown in the final column in table 2.

The discounts shown in the third column represent Standard & Poor's estimate of loss in net revenue from a plant's outage. Low variable-cost generators have a higher "spark spread" (the difference between the price received for electricity and the variable costs of production), given the same price of power. Consequently, the discount for lower variable-cost facilities is higher. Figure 4 contrasts two base load plants on the same price duration curve. Both plants are assumed to have no variable costs, but one plant has a 100% availability factor, and the other has a 90% availability factor. The area below the price duration curve represents a facility's net revenue. The net revenue for the plant on the left (100% availability), $231/kW-yr, is represented by the entire area under the price duration curve because it operates all 8,760 hours in a year. The net revenue for the plant on the right is less, at $215/kW-yr because its area under the price duration curve is reduced to reflect the 90% availability factor.

Accounting for regional differences. Because natural gas-fired CCGT units will likely be the market-clearing technology for most U.S. power

Table 2

Net Revenue Forecast Based on Unit Variable Costs (at 2000 prices)

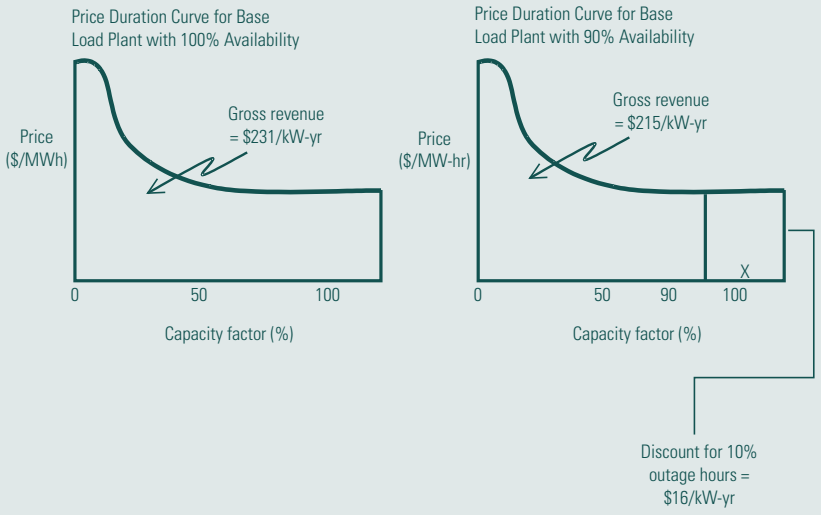
Variable cost ($/MWh)	Net revenue ($/kW-yr)	Discount for each % availability below 100% ($/kW-yr)	Net revenue at 90% availability ($/kW-yr)
>52	50	0.01	50
Benchmark CT 52	50	0.01	50
48	52	0.01	52
44	55	0.01	55
41	57	0.01	57
37	60	0.01	60
33	63	0.01	62
30	65	0.01	65
26	68	0.02	68
Benchmark CCGT 22	71	0.03	71
21	74	0.03	73
20	77	0.06	76
19	80	0.09	79
18	84	0.13	82
17	88	0.17	87
16	94	0.23	91
15	100	0.29	97
14	106	0.35	103
13	114	0.43	110
12	123	0.52	118
11	132	0.61	126
10	141	0.70	134
9	150	0.79	142
8	158	0.87	150
7	167	0.96	157
6	176	1.05	165
5	185	1.14	173
4	193	1.22	181
3	202	1.31	189
2	211	1.40	197
1	220	1.49	205
0	231	1.60	215

markets, the cost of producing power using this technology should limit power prices. These production costs are a function mainly of natural gas prices, labor costs, and capital costs. Power prices may differ by the same extent that these costs differ by region. Standard & Poor's has observed some notable differences in these costs that are taken into account when applied to actual ratings:

- Prices for delivered gas in the producing regions of the Gulf Coast and the Rocky Mountains are expected to be about $0.20/mmBTU lower than prices in the rest of the country mostly because of lower transportation costs in these regions. As a result, base load units in these regions that do not run on natural gas can expect to receive less net revenue than base load plants in other parts of the country. Units that run on natural gas will not be affected because their net revenue estimates are based on the expected margin above their variable costs, which comprise mostly the cost of natural gas.
- California and New York City have higher construction and labor costs than other areas of the country. As a result, the assigned net revenue for these areas can be expected to be higher than that in other parts of the country. Construction costs in Texas and parts of the South are lower; therefore, net revenue there can be expected to be lower than that in other parts of the country.

Standard & Poor's makes adjustments to the net revenue analysis on a case-by-case basis if sufficient evidence demonstrates that the cost of producing power, or importing it, in a market is higher or lower than Standard & Poor's benchmark price.

Figure 4
Price Duration Curve Comparison for Base Load Plants with 100% and 90% Availability



How Standard & Poor's Applies Net Revenue Analysis

The net revenue analysis starts by forecasting a generating asset's expected long-term net revenue (gross revenue less variable cost). Revenue potential is expressed as $/kW-yr. Net revenue is also expressed in $/kW-yr rather than cents per kW hour (kWh) or dollars per megawatt hour (MWh) because the average annual price of electricity can be meaningless when evaluating peaking and intermediate unit economics.

Peaking and intermediate units rely on positive margin periods to generate revenue (e.g., when a plant produces power at $.04/kWh and sells it for $.07/kWh). Owners of peaking and intermediate units are not concerned with the annual average market price as long as they operate in enough periods with a positive spark spread to cover their fixed and capital costs. The exact combination of the actual spark spread and the duration of operations does not matter as long as the net revenue in excess of variable costs covers fixed O&M and capital costs.

Furthermore, the net revenues of different generating assets are tied to each other on an absolute basis. As mentioned earlier, if a peaking unit's net revenue drops by $20/kW-yr, revenue for a base load plant in the same market would also drop by the same amount $20/kW-yr because the price paid per kWh of power is the same whether a peaking , intermediate, or base load unit produces the power during peak demand. When all units are running, peaking, intermediate, and base load plants would receive the same revenue per kW of capacity during that period. The result is that a peaking asset's net revenue is simply a subset of an intermediate unit's net revenue, which is itself a subset of a base load unit's net revenue.

Some examples of how Standard & Poor's applies net revenue analysis to specific units may help explain the analysis. Table 3 presents the parameters of two generating assets, a new CCGT and an existing coal plant.

In example 1, the analysis compares the variable costs of the new CCGT unit against those of the benchmark unit. Both units have the same heat rate, but the CCGT unit has higher variable costs. Therefore, the expected net revenue for the CCGT unit will be reduced by the difference between the two units' variable costs. In this example, the differential equals $3/kW-yr. The resulting net revenue for the new CCGT is $68/kW-yr *(see table 2, columns 1 and 2)*.

In the second example, which could be an existing base load asset, the analysis is a little different. The first step is to determine the net revenue based on the asset's variable cost, which is $14/MWh. Looking at table 2, columns 1 and 2, this unit would earn expected net revenue of $106/kW-yr, assuming it runs at 100% availability. But, because the base load unit in this example has an availability factor of 90%, its net revenue would be reduced by $3.50/kW-yr ($0.35 times 10) to $103/kW-yr *(see table 2, columns 3 and 4)*.

These two examples might suggest that using net revenue has made the analysis of competitive power a simple task. But analysis of this industry is much more complicated. Standard & Poor's considers the many intricacies of the power markets when the analysis is applied to actual ratings. After determining an asset's expected net revenue, the next component of the analysis is assessing whether an asset's financial cushion is large enough to sustain plant operations during periods of market volatility.

An Appropriate Financial Cushion

Standard & Poor's fully expects volatility in a generating asset's expected net revenue. Like any operating margin, net revenue may increase or decrease due to short-term factors creating market price volatility. But in the long term, net revenue should be tied to the cost of incremental supply or the cost of the new entrant. Because power tends to be a cyclical commodity subject to boom and bust periods, a generating unit must be able to weather downturns to withstand some revenue volatility. Therefore, Standard & Poor's developed the financial cushion measurement to assess a generating asset's ability to withstand volatility in its gross margin. The financial cushion is simply an asset's expected net revenue less its fixed costs and debt-service obligations, all expressed in $/kW-yr.

Along with sufficient liquidity (a debt-service reserve for project-type entities or a line of credit for corporate entities), merchant power plant's financial cushion should be able to withstand a $28/kW-yr drop in net revenue, to be consistent with an investment-grade rating. Standard & Poor's developed its financial cushion guideline based on previous rating exercises and on studies of price movements and volatility in various U.S. power markets. The $28/kW-yr financial cushion guideline was sized mostly to account for actual and expected market volatility. A larger cushion, however, may be required to account for other risk factors such as operating risk, mix of generation assets in a specific market, or environmental risk. Conversely, mitigating factors such as offtake contracts, the potential for cost reduction, or true diversification among a generating company's portfolio may lead to a lower financial cushion guideline than $28/kW-yr.

Measuring the financial cushion in $/kW-yr (as opposed to a typical debt-service coverage ratio or percentage drop in revenue) provides a starting point to compare different generating asset types consistently, whether they are peaking, intermediate, or base load units. The use of the financial cushion in net revenue analysis complements debt-service coverage ratios or other operating margin measures that indicate a company's ability to sustain lower revenues or higher expenses. Standard & Poor's notes that the analysis of multiple scenarios that explore different fuel prices, generation overbuilding, as well as different new entrants remains part of its competitive generation analysis. Scenario

Table 3

Net Revenue Analysis Examples

	Benchmark new CCGT entrant	Example 1: New CCGT plant	Example 2: Existing coal plant
Heat rate	7,100 BTU/kWh	7,100 BTU/kWh	9,500 BTU/kWh
Variable costs	$22/MWh	$26/MWh	$14/MWh
Availability factor	95%	95%	90%
Net revenue (according to variable costs in table 2)	$71/kW-yr	$68/kW-yr	$103/kW-yr

analysis can point to the need for larger or smaller cushions, as well as the financial implications of price duration curves that may depart in the long run from Standard & Poor's benchmark curve.

Appendix

What is needed to calculate a financial cushion? Standard & Poor's requests that companies provide financial projections on a cash basis for the term of the debt being rated. The long time period reflects the extended nature of commitments in the power industry, such as long-term contracts, nuclear and hydro facility licenses, and deregulatory timetables. The projections should include all cash costs associated with operating the facility: fuel costs, fixed and variable O&M expenses, and capital expenditures. For a generating company, general and administrative (G&A) expenses and scheduled debt-service obligations can be provided on a companywide basis.

Normalizing financial projections to $/kW-yr. Once Standard & Poor's receives the financial projections, all revenues, expenses, and debt-service obligations are normalized to $/kW-yr. For example, if a 1,000 MW generating unit has annual fixed costs of $30 million, its fixed costs would be $30/kW-yr. For a generating company, G&A expenses and debt-service obligations, which are not asset-specific, would be normalized based on the company's total generating capacity. For example, if a company has 10,000 MW and $100 million of annual debt-service obligations, its debt-service obligations would be $10/kW-yr. Standard & Poor's always uses a unit's summer net dependable capacity as reported to the National Energy Regulatory Commission (NERC) to ensure consistency across its treatment of generating assets.

Organizing financial projections. Financial projections usually include gross revenues, fuel costs, variable O&M expenses, fixed O&M expenses, maintenance capital expenditures, and scheduled debt-service obligations. Standard & Poor's organizes these items into three components: net revenue, fixed costs, and debt-service obligations, all expressed in $/kW-yr. The analysis excludes capital expenditures for new capacity construction, which are considered separately as a growth risk. Trading and contract expenses are considered part of fixed costs.

- Net revenue—Standard & Poor's determines net revenue for a generating asset based on that asset's variable-cost profile compared with that of Standard & Poor's benchmark new entrant. The net revenue is calculated by subtracting variable costs from gross revenues. Variable costs include fuel costs (the actual price of the fuel and the variable portion of the fuel transportation cost) and variable O&M expenses (emission credits, water usage, chemicals, and other consumables).
- Fixed costs—These include fixed O&M expenses (parts, labor, property taxes, lease payments, and insurance), G&A costs, and the maintenance capital expenditures needed for the continued operation of a plant, such as major repairs and equipment retrofits. Major maintenance expenses are generally considered fixed O&M costs. In the case of advanced gas turbines, major maintenance expenses may be considered a variable cost if the expenses are a direct function of the number of starts and operating hours logged.
- Debt service—Debt-service obligations consist of scheduled interest and principal payments. If amortized too quickly, principal payments can negatively affect the calculated financial cushion. On the other hand, bullet maturities introduce refinancing risks. When bullet maturities are present, Standard & Poor's does not assume an amortization schedule when calculating the financial cushion, but considers refinancing risk to be negative for credit quality.

Escalation rates. The net revenue figures, as well as the financial cushion guideline, are increased by 2% per year, using 2000 as the base year, to reflect nominal price increases.

Project Collateralized Loans and Bonds: Rating Considerations

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Project financing has long been focused on two chief ways of raising debt capital: project loans backed by the revenue of individual project facilities and project developer debt backed by cash flow from leveraged and unleveraged ownership interests in a number of projects. At the present time, lenders and sponsors are increasingly looking to a third way to raise debt and equity capital for project financing in the form of securitized project collateralized loan obligations (CLOs) and collateralized bond obligations (CBOs). Bonds are now being issued to fund closed-end-defined pools of project loans made by banks and multilateral/expert credit agencies, and l999 may see the first open-ended-pooled financing for infrastructure facilities. To date, several types of securitization structures and features have been used. These include closed-ended defined pools of project loans and open-ended financings. Sponsors have used both true sale of assets and setting up a portfolio where credit risk has been synthetically transferred to the CLO securities.

Under a CLO or CBO structure, capital market bonds are paid by cash flow generated from a pool of project loans or bonds. The credit strength of the bonds generally will be stronger than the credit strength of any individual loan, to the extent that the pooled cash flows diversify the default risk and principal loss potential inherent in the loan making up the pool. In addition, the bonds may benefit from overcollateralization by loans and loan cash flows. Typically, these bond issues use tranching to give separate series of bonds priority claims on the pools' cash flows. Standard & Poor's stresses that this type of securitization does not constitute any credit alchemy—rating elevation results only from specific credit strength provided by diversification, subordination, and overcollateralization. However, Standard & Poor's believes that CLO/CBO securitization does represent one of the most significant ways that borrowers likely will tap the broader market for project debt. It brings significant advantages for borrowers, capital market investors, and bank lenders.

- For borrowers, it offers a way to raise debt capital at lower costs and with more attractive terms and tenor than those available for individual projects.
- For investors, it represents an efficient way to diversify the risks inherent in individual project loan or bond investments. In addition, CLOs may offer substantially greater liquidity than single-asset project investments, especially those that do not carry credible ratings.
- For bank and agency lenders, project CLOs provide a way to liquefy one of the largest illiquid components of bank loan portfolios. Thus, lenders benefit from regulatory capital relief, as well as expanded lending capacity. One of the chief motivations for many bank lenders is the immediate opportunity to improve profitability by redeploying capital.

Standard & Poor's believes the growth of project CLOs and CBOs will be an important step in expanding the participation of portfolio investors in the broader infrastructure debt markets. However, potential issuers should recognize that effective use of rated project CLO and CBO structures will require sponsors to address key credit questions inherent in this type of securitization as it applies to infrastructure, notably:

- How do post-default recovery rates compare for projects, especially in the emerging and developed countries, where project loans are increasingly being originated?
- How diverse are project risks really likely to be across sectors and regions—particularly, should project debt experience some generic challenges such as construction, operating, or political risks across a number of countries?
- How does default likelihood change over the life of a loan? For amortizing loans, there is evidence, for example, that loans are less likely to default after they have amortized a substantial amount of debt.

Initial information indicates that answers to these questions are favorable for pooled project debt issues. For example, recovery rates may be higher than those on comparable corporate loans, where project loans are appropriately secured and economic incentives strongly support project debt. However, much will depend on the ability of project sponsors and sponsors of project portfolios to document the key project data on which credit assessment of portfolios will necessarily rest, in particular, project-specific information on default timing, duration, and recovery rates.

For many types of project loans, default and loss severity experiences are still fairly limited. This is especially true for cross-border project loans, such as infrastructure projects raising capital in hard currency and repaying the loans from local currency tariffs or governmental support payments. Because the data on default timing, recovery, and loss severity does not have a statistically significant track record, on-going surveillance is important to maintain ratings on the CLO securities, especially for the ratings on the subordinated and junior tranches. Standard & Poor's expects the ratings on the junior and subordinated tranches of project finance CLOs to be more dynamic than typical structured finance securities. Until statistically significant data are available, any assessment of default rates and loss severity and how they affect the ratings on the CLO securities needs to be monitored closely on an ongoing basis. Standard & Poor's believes it will be some time before actuarial assumptions will be established for the key credit risk factors that drive a project finance CLO rating.

In view of these uncertainties, lenders and borrowers who are contemplating this type of financing will be well served to focus on the specific pool of assets supporting a given transaction, as Standard & Poor's does in establishing its CBO and CLO ratings. It is the credit profile loans supporting a given asset-backed debt issue rather than any generic assumptions about global loan performance that will determine whether a project CLO or CBO issue will pay out.

Standard & Poor's Project Finance CLO Rating Criteria

In a CLO transaction, payments to the CLO noteholders are derived from the cash flows realized from the underlying pool of loans in the securitized portfolio. While most of the CLO transactions rated to date involve the repackaging of corporate loans, the rating process for a transaction with project loans as the underlying asset class is similar. Rating any CLO transaction requires a linear approach with distinct levels of analysis. The first level of analysis is an assessment of the credit quality of the underlying assets. The second level of analysis focuses on the default and loss severity characteristics of the pool. The third level of analysis involves cash flow forecasts, and the last level examines the structural features of the transaction.

In preparation for rating CLOs with project loans as the underlying assets, Standard & Poor's researched the loan structure and behavior of project loans and concluded that project loans have different fundamental characteristics than corporate loans. As a result, the criterion inputs needed to perform the analysis of a CLO transaction with project loans as the underlying assets will differ from those for transactions with corporate loans. Through internal studies and conversation with external parties, Standard & Poor's has concluded that the key differences between project loans and corporate loans result from:

- Different credit profiles,
- Different loan structures, and
- Different behavioral characteristics.

Different Credit Profiles

Project financing is normally used for large, capital-intensive assets. Usually, the inherent risks of an asset using this financing structure are easily identified. Through the rating process, Standard & Poor's can determine if the project's risks are mitigated and to what extent the risks are residing with the lenders. The types of assets that have availed themselves of this financing technique include power plants, pipelines, toll roads, mines, energy facilities, and infrastructure projects. These types of assets are rated by Standard & Poor's following an established criteria framework.

The analysis of any project financing takes a bottom-up approach, focusing on project-level risks, institutional risks, currency risks, sovereign risks, and any credit enhancements structured into the transaction. Typically, the financial profile of a rated project appears weaker than that of a similarly rated corporation in the same industry. For example, the initial debt leverage for a 'BBB' rated power project is generally higher than that of a 'BBB' rated utility company. Despite the weaker financial measures, Standard & Poor's may be able to assign the same rating to the project as it does to the corporation if the predictability of the project's cash flows is greater.

Project finance transactions are usually made up of a single asset, are owned by the private sector, and are dependent solely on the performance of the project (nonrecourse to the owners) for repayment of any debt issued at the project level. In addition, the structural, legal, and financial features incorporated into most project transactions to protect and enhance the cash flow make it easier to predict a project's cash flow stream and to determine the project's ability to service its debt obligations.

Different Loan Structures

Project loan structures differ from corporate loan structures in that projects typically have amortizing debt, tailored debt service payments, stricter covenants, and cash traps. Amortizing debt mitigates refinancing risk. Refinancing risk is usually present in corporate financings and forces Standard & Poor's to look beyond the tenor of the debt to assess the ability of the corporation to repay its obligations. In contrast, the lack of refinancing risk in most project financings allows Standard & Poor's to focus purely on the project in relation to the tenor of the rated debt. Amortizing debt also leads to decreasing debt leverage over time, which is beneficial from a credit perspective.

Tailored debt service payments are also a strength of project financings. Project financings usually pay down principal as time progresses. However, there is no limitation on how the schedule of principal repayments can be designed. Therefore, projects can match repayment of debt with cash flows expected from project operations.

Covenants and cash traps within the financing documents of the transaction also lead to a better ability to monitor projects. The better ability to monitor transactions can help the lenders be more active in their dealings with the project's owners and management. While differences in the loan structure can affect the underlying rating on a project, these differences are also the primary reasons why corporate and project bonds behave differently as stress situations develop and as defaults and restructurings take place.

Different Behavioral Characteristics

Most corporate financings typically issue unsecured debt. In contrast, most project financings pledge to lenders both the physical assets and the revenues to be derived from operations. The secured nature of project loans provides the lenders with a different type of claim on a borrower's assets, which, in the event of a stress scenario, may be a better incentive to project sponsors to carry or fund a project's obligations through a short-term anomaly. In addition, the project financing structure is generally used for infrastructure and other essential assets. The type of assets that avail themselves to a project finance structure has led Standard & Poor's to conclude that defaults with ensuing restructurings, rather than liquidations, will likely be the norm for project finance transactions experiencing stress. This assumption is based on an analysis of troubled project finance transactions in both the bank and capital markets.

While construction, technical, operating, or market difficulties have caused projects to experience problems, overleverage is usually the primary reason for a project financing to get into financial trouble. Most project financings are highly leveraged transactions, and therefore, the debt-expense component of total expenses will likely be higher when compared to that of a similarly rated corporate financing. Excess leverage has caused many defaults of both projects and corporations. However, Standard & Poor's believes that project financings have a larger capacity than corporations to carry high leverage. Although high debt levels will negatively affect the underlying rating on a project financing, most projects generate higher cash flows than cash expenses from operations, which means that some level of debt can be supported. Therefore, in a stress scenario, a restructuring can take place that lowers the yearly debt service requirements but extends the maturity of the project loan.

Due to the differences in credit profile, loan structure, and behavioral characteristics, Standard & Poor's has concluded that project loans act differently and are structurally different from corporate loans. As a result, Standard & Poor's has modified the necessary inputs in the CLO rating process to better reflect the characteristics of project loans. Each stage of the established CLO rating criteria has been modified to properly reflect the underlying fundamentals of project finance loans. Specifically, the areas that have been modified include:

- Credit assessments of a pool's underlying assets,
- Default model characteristics,
- Cash flow analysis characteristics, and
- Diversity characteristics.

Credit Assessment of a Pool's Assets

The primary change in this stage of the CLO analysis has to do with the credit assessment of the loans in the proposed pool of loans. Due to the uniqueness of each individual project, Standard & Poor's will perform credit assessments for each loan in the proposed pool. If the size of the proposed pool of project loans makes an actual analysis unwieldy, Standard & Poor's may rely on sampling techniques.

If the number of project loans in the pool is approximately 25 or less, Standard & Poor's

will assign an actual credit assessment to each individual loan. Generally, if the number of loans in the pool is more than 25, Standard & Poor's will assign credit assessments to some subset of the portfolio, as long as a sampling technique can be utilized.

As part of the sampling process, Standard & Poor's interviews the lending institution's personnel to gain insight into its credit origination, surveillance, and workout procedures. The sampling process will also place constraints on the lending institution to avoid "cherry-picking" and the substitution of weaker credit quality loans for stronger credit quality loans once the portfolios have initially been designed. Standard & Poor's requires the lending institution to provide the documentation needed to properly assess the credit quality of the underlying loans.

Default Model Characteristics

The result of the credit assessment process will give a rating distribution on all the assets in the portfolio. The default frequency of a project and corporate loan with the same rating is statistically equivalent. Therefore, the proprietary Standard & Poor's default model used for other CLO transactions can be used for portfolios with project loans as the underlying asset. The default model estimates how many loans in the portfolio will experience a default based on each loan's credit rating and payment characteristics.

As with other types of CLO transactions, Standard & Poor's employs either a "traditional" single-jurisdictional default model or a multijurisdictional default model to assess the default probability of a pool of project finance loans. The specific version of the model used is dependent on the characteristics of the asset portfolio. The single-jurisdictional model is used for transaction that do not have a significant level of projects concentrated within the same sovereign country. The multijurisdictional model is used when multiple projects are concentrated within the same country. The multijurisdictional model factors into the default probability the likelihood of default on all the projects situated in the same country, caused by the actions of the sovereign government (for example, exchange controls affecting all projects). Standard & Poor's will work with the issuer to establish which default model must be used, based on the characteristics of the project portfolio.

One critical area in the default analysis is the assessment of diversification penalties. Diversification penalties are reductions in a loan's implied ratings due to high degrees of correlation between assets in the portfolio. The correlation analysis between individual project finance loans in a pool will be done at the beginning of the rating process to give the sponsor the ability to alter the portfolio to make it as efficient as possible. The correlation between the same type of infrastructure assets will depend on the specific characteristics of each individual loan and the interplay of each loan within the overall pool. The correlation between similar types of project loans could actually be minimal because of the unlikely chance of experiencing credit deteriorations. Two examples illustrate this point.

First, the financing of a toll road in Arizona will have very little positive correlation to a toll road financing in Florida. Second, a power plant selling power to a New York utility has very little positive correlation to a power plant selling power to a Brazilian utility. In both cases, the reason for the default would be specific only to that asset. Standard & Poor's, however, believes that diversification penalties should be assessed for project loan CLO transactions that

Table 1

Standard & Poor's Geographic Regions for CBOs/CLOs

Latin America and the Caribbean	Eastern and Central Europe, Turkey
Chile and Colombia	The Gulf States
Southeast Asia and Korea	Africa and the Middle East
India and Pakistan	Sub-Saharan Africa
Sri Lanka, Bangladesh, and Nepal	South Africa
China, Hong Kong, and Taiwan	Pacific Islands
Russia and the CIS	

Table 2

Rating Notch Down by Regional Concentration

Regional concentration	Notch cown
Less than 15%	0 notches
15% to less than 25%	1 notch
25% to less than 30%	2 notches
30% to less than 35%	3 notches
Above 35%	Case-by-case analyses

have high degrees of obligor and/or geographic correlations. The current Asian crisis and the Latin America crisis of the 1980s show that geographical correlation extends to entire regions and is not limited to single country correlations.

Standard & Poor's has divided the world into 13 regions, as shown in table 1.

The economic environment of countries situated in each region are likely to be correlated, and as such, economic difficulties may be experienced by a number of the countries at the same time. This correlation may lead to increased pressure on the projects and lead to higher defaults. To account for this correlation in determining the default probability, Standard & Poor's will notch down the rating of each project in a given region as shown in table 2.

In addition to diversification penalties for obligor and geographic concentrations, these penalties will also be assessed if there are significant concentrations and correlations in critical project finance aspects. Critical aspects include a purchaser of projects' products, key suppliers to projects, technology supporting projects, and a provider of project-level credit enhancements. Standard & Poor's analysis will explore these relationship types for any proposed CLO project loan transaction. If there is a significant concentration (for example, a high portion of the projects sell electricity to one utility), Standard & Poor's will assess additional diversification penalties for all the noncomplying project loans.

The level of a correlation penalty will be determined on a case-by-case basis. However, Standard & Poor's will use the criteria already established as a guideline. The severity of diversification penalty is based on the overall level of concentration and normally ranges from a one- to three-notch downward adjustment from the original project loan credit assessment.

Cash Flow Analysis Characteristics

In a CLO transaction, Standard & Poor's assumes a certain number of the underlying pool's assets will default. The amount of defaulted loans will be specified by the default model. Therefore, assumptions surrounding loan restructurings are critical to the rating analysis of the CLO transaction. Specifically, for CLOs with project loans as the underlying pool assets, Standard & Poor's must determine how the underlying loans will act in terms of timing of default, timing of recovery, and loss severity.

Default timing. To rate a CLO made up of project loans, Standard & Poor's will run a number of sensitivity analyses, varying default timing. The standard default scenarios include concentrations of defaults throughout the transaction. In each of these cases, the rating will be determined by the transaction's ability to make every scheduled debt service payment. Standard & Poor's has concluded that when there is a pool of amortizing loans, running back-end stress scenarios, typical for corporate loans, may be unnecessary. In the case of a pool of amortizing loans, a project loan nearing the end of its term is probably less likely to default when compared to a loan facing a bullet or balloon payment due to the amount of equity accretion in the project. Similar to a mortgage on property, it is in the owner's interest to make scheduled loan payments on project debt to avoid the loss of a project that has been significantly paid for. Consequently, given the lower likelihood of default late in the project loan life, the need for a back-ended loss scenario is minimal.

Recovery timing. The established CLO criteria states that there is a one-year no-pay period followed by two successive years in which 50% of the total amount to be recovered is received at the end of each year for the loans chosen to default in the cash flow analysis. After researching project finance loans, Standard & Poor's concluded that the timing of recovery on project loans will, on average, be shorter than the recovery timing on comparable corporate loans. While Standard & Poor's still anticipates a period where no interest or principal is received, the recovery of the estimated recovery percentage may occur faster than for corporate loans, depending on the structure of the projects and where they are domiciled. A faster recovery is generally due to the structural protections incorporated into project financings and the fact that borrowers are more likely to be aware of and can react to the negative situations in a more timely fashion. These protections include:

- Distribution/dividend blocks,
- The need to use the debt service reserve,
- Items that trigger an event of default, even when there may be enough cash flow to pay debt service, and
- The ease of monitoring these transactions.

Loss severity. Standard & Poor's has identified a number of items that illustrate why project finance loans are fundamentally different from corporate finance loans in the area of loss severity. These items include:

- Project debt secured by both physical assets and the contracts underlying the transaction;
- Larger step-in rights of lenders to projects;
- Clear contractual obligations, penalties, and remedies incorporated into project transactions;
- Decreasing leverage over time;
- Essential nature of many infrastructure projects;
- Linked inputs and outputs; and
- Vested interests of counterparties.

The presence of these items causes Standard & Poor's to conclude that the recovery rate for project loans on average will be higher than that of corporate loans. However, empirical evidence on the actual history of loss recovery for project loans is lacking, and it is likely that the actual recovery rates will differ based on the asset type and where the asset is domiciled. Therefore, Standard & Poor's will assign a recovery value for each loan that has received a credit assessment in an effort to determine an average pool recovery rate. The range of recovery rates assumed for individual project loans in a CLO transaction is expected to fall in the 30%-70% range.

Structured Finance Issues

Once Standard & Poor's completes its analysis of the underlying pool of loans and determines the total amount of losses required to support each rating level, an analysis of the transaction's cash flow and structure is performed. Factors such as the priority of payments, servicing fee, interest coverage, the transaction's liquidity, and the legal final payment date of the rated securities are all considered in the analysis.

Priority of payments. The priority of payments or cash flow "waterfall" refers to the manner in which the transaction pays its obligations under the governing indenture. In most CLO transactions, cash flows are allocated to pay the senior class of notes before the subordinated or junior classes are paid. Shutting off principal payments to the junior notes in favor of the senior notes acts as credit enhancement. Credit enhancement in a structured financing is a mechanism that protects a class of notes against a payment default. Consequently, those notes in the senior position in the priority of payments will receive a higher rating, since junior securities and/or overcollateralization assume a first loss position.

Servicing fee. The servicing fee must be sized and quantified to ensure that not only the initial servicer is adequately compensated, but also that a successor servicer or backup servicer would be able to service the pool of project finance loans given the level of compensation. Standard & Poor's will require either a "hot" backup servicer that can immediately assume the role of servicer or the submission of a detailed plan that can readily be implemented if the initial servicer is unable to carry out its required responsibilities. As part of Standard & Poor's servicer review, the successor or backup servicer must provide a detailed history of its experience in servicing project finance loans. During this review, the potential successor servicer must demonstrate to Standard & Poor's satisfaction that it has the capability to service not only project loans, but also the relevant industries that encompass these financings.

Among its duties, such as ensuring that all investors receive their payments, it is the responsibility of the servicer to manage the restructuring process for troubled loans. Since the servicer's role is the linchpin in ensuring repayment of the debt securities, Standard & Poor's believes that servicing and administrative fees should be paid prior to any payment to noteholders. This will protect investors against potential disruption of payments caused by workouts on problem project loans.

Interest coverage. The timely repayment of interest must be ensured by structural features that protect against a mismatch of interest earned on the project finance loans compared with the interest owed on the CLO liabilities. Therefore, an interest-coverage covenant must be incorporated into the transaction that states that the interest earned on the assets (project loans) is greater than or equal to the interest on the securities plus servicing fees. If an interest rate swap were to be incorporated in a transaction to cover the risks associated with a pool of fixed-rate loans paying floating-rate interest or vice versa, then the cost of the swap must be included in the interest coverage test.

Transaction liquidity. While a transaction may be tranched sufficiently to ensure noteholders' repayment of their investment, the transaction may not have sufficient internal liquidity to make such payments on a timely basis. Therefore, a liquidity reserve funded either at the inception of the transaction or over time, if there is sufficient cash generated or excess spread during the initial life of the transaction, can be utilized to ensure timely repayment of principal and interest in a liquidity squeeze.

Once the transaction's structure and cash flows are reviewed, Standard & Poor's will then stress losses, determined by the CLO model, over the tenor of the transaction. As mentioned earlier, Standard & Poor's will focus the stress analysis on front- and middle-end scenarios for a pool of amortizing project loans. However, if balloon or other nonamortizing loans were included in the portfolio, a back-ended stress scenario would be more heavily weighted. After reviewing the various stressed cash flows, Standard & Poor's will determine if the proposed capital structure or credit enhancement is sufficient to meet the desired rating. Credit enhancement usually takes the form of subordinated securities (tranching) and/or overcollateralization, but does not preclude other forms of enhancements such as an LOC.

Set-off risk. Set-off risk arises when the project obligor may have other contractual relationships with the sponsor or lender. If the sponsor or lender goes insolvent or can not perform, the obligor may chose to set off or reduce the balance of the project loan by the amounts on which the sponsor or lender have not performed.

Depending if the loans documents contain provisions against set-off, Standard & Poor's will examine the enforceability of the provisions and size a commensurate amount of credit support or sellers interest in master trust structures to cover such risk.

Legal final. The legal final payment date for the rated debt must either be the date on which the last payment of the last loan outstanding is paid or some subsequent point. The importance of having an extended legal final payment date should not be understated. It is expected that defaults will occur over the life of the transaction. Those loans that do default will either be liquidated or restructured in such a way as to provide cash payments to the transaction, although likely at reduced levels. The terms of this restructured loan must have repayment occurring before the termination of the transaction. Any project loan restructuring that would extend the life of the loan beyond the final payment date of the transaction, and not structurally mitigated, would cause a reduction in the transaction's cash flows and be considered a representation and warranty violation with the potential of causing a default on the rated securities.

Interest rate basis. Many project finance loans allow the obligor to select and change the index on which interest accrues. For example, the obligor may have the option of selecting three-month LIBOR or six-month LIBOR, or perhaps any other index, as the index. This option can create a basis risk in the transaction if the Liabilities of the trust pay interest based on a different index than that of the assets.

The level of risk presented by this is based on the characteristics of the assets included in the trust and the transaction structure employed. To overcome this risk, the transaction sponsor should consider including in the transaction a basis swap or matching the interest basis characteristics of the liabilities with the assets.

When the interest basis of the assets and the liabilities is different, Standard & Poor's will stress the transaction by running multiple cash flow scenarios under different interest rate paths.

Alternate loan amortization schedules. Some project finance loans allow the obligor the option of deferring principal payments or changing the principal payment amortization schedule. If such loans are to be included in the securitization, the sponsor must notify Standard & Poor's of these features and provide the appropriate details. Standard & Poor's will analyze these loans and assume that the obligor will chose the payment options that will maximize the default probability of the loan. Clearly, a 10-year level pay amortizing loan has a different probability of default as compared with a 10-year bullet amortization.

Modified and restructured loans. During the life of the securitization, it is possible that some project finance loans are modified or restructured. The loans may be restructured with respect to payment terms, interest rates, and tenor. Because the new terms might not be consistent with the structure of the securitization, any variance in the maturity and payment characteristics of the loans will be addressed during Standard & Poor's surveillance of the transaction rating. The transaction structure must be sufficiently robust to allow some potential changes in the nature of the collateral. Standard & Poor's will work with the sponsor in addressing this risks in the proposed structure.

Closed and Open Collateral Pool Considerations

The majority of project finance transaction that Standard & Poor's has been asked to evaluate so far consist of a closed pools of assets, where all loans have already been originated and fully funded. Over the last year, however, Standard & Poor's has received inquires from a number of

sponsors wishing to structure transactions with an open pool of project finance loans. The sponsors already have a critical core of assets but wish to structure a transaction that is larger than the current asset pools. By over-issuing liabilities, such transaction may offer more efficient execution and the opportunity to fund future projects.

Regardless of which approach is used, Standard & Poor's must evaluate and rate each project as is included in the asset pools. In addition, Standard & Poor's must establish a specific recovery estimate for each project, should it default.

Establishing the capital structure for a closed asset pool transactions is relatively straightforward since the uncertainty regarding the characteristics of the assets has been removed. Standard & Poor's analyzes the pool of project finance loans to establish the rating on each project, its post-default recoveries, and the expected default rate for the pool. The capital structure for the transaction is then established by running cash flows proving that the notes can withstand the level of stress commensurate with the rating.

Structuring open asset pools transactions is possible but must incorporate features to control how far the collateral pool characteristics may migrate. As in all structured transactions, Standard & Poor's main concerns with open asset pools are driven by how subsequent asset additions will affect the following features of the final asset pool:

- Default frequency,
- Recovery rate, and
- Cash flow characteristics.

In closed pool transactions, all of the characteristics of the assets are essentially locked in at closing and are used to establish the capital structure needed to achieve the required rating In open pool transactions, the characteristics of the collateral will change; hence, the capital structure for the transaction must be sufficiently robust to withstand such potential changes.

Most CBO/CLO transaction structured with corporate loans and bonds incorporate an open pool concept. The transactions typically start with 50% to 60% of the asset pool already purchased at closing and typically have a 30- to 90-day ramp-up period to fully acquire all the collateral assets. The transaction then enters a reinvestment period during which any principal collected is not used to repay the investors, but rather is held and used to purchase new collateral assets. Following the end of the reinvestment period, the transaction enters an amortization period during which principal collections are used to repay the investors.

The same approach may be employed in project finance CLOs. However, since the universe of project finance loans is less broad and less liquid than the universe of corporate loans, the risks associated with open asset pools may be more acute since they also include the following risks:

- The sponsor may not be able to underwrite or purchase project loans eligible for inclusion in the transaction, and
- Principal collections may not be able to be reinvested quickly in new projects.

The inability to quickly invest the issuance proceeds from the bond offering or the principal collections from performing projects creates a negative carry on the transaction. The funds not invested in project loans are typically held in other types of eligible deposits generally yielding less than the project loans, and possibly less than the interest payable on the bonds.

To overcome these risks, the sponsors have proposed longer ramp-up and reinvestment periods than traditionally seen in corporate loan CLO transactions. To rate such structures, Standard & Poor's must not only be convinced that the capital structure is sufficiently robust, but must also get comfortable with the sponsors' ability to continue participating in the project finance market and to underwrite transactions in the future. The longer the ramp-up period and reinvestment period, the more likely it is also that market conditions would change and not allow the sponsor to fully acquire all the needed assets.

Sizing capital structure for open asset pools. The first step in establishing the capital structure for a project finance CLO transaction is to size the default frequency expected for an open pool of assets. To do so, Standard & Poor's used the following two approaches:

- Active use the default model with cash flow modeling, or
- Sizing the capital structure of the transaction assuming a "worst-case portfolio."

Standard & Poor's will work with each sponsor to customize on of the above two approaches based on the transaction requirements, and the sponsor's capabilities and area of operations. Discussed below is a general description of each approach.

Active use of the default model with cash flows. Under this approach, the issuer gets credit for the quality of the existing asset portfolio. The default model is run prior to setting the capital structure of the transaction by using a combination of the actual existing portfolio ratings and an estimate of the ratings and cash flow characteristics of the future projects, which will be added. This establishes an expected default frequency. The same is done to establish an expected recovery rate for the portfolio, based on the actual and expected. Standard & Poor's will work with the sponsor to make sure that the characteristics of the future projects are realistic and achievable by the sponsor.

The capital structure of the transaction is then set based on the cash flow results achieved using the expected default probability and recovery rates. Obviously for this to work, the default frequency and recovery rate of the loan portfolio available at closing must be better than the expected rates, otherwise interim credit support solutions must be incorporated in the transaction.

After the transaction closes, projects may be added to the transaction as long as the resultant expected default and recovery rates are not violated. The collateral manager must run the default frequency model using the existing portfolio and substituting the details of the planned acquisitions for the ones inputted as the expected projects. If the results of the default model are at or below the default frequency used in sizing the capital structure, then the acquisition can take place. Additionally, recovery rates and the cash flow characteristics of the planned acquisition are reviewed to insure that they do not violate the earlier assumptions.

The main advantage of this approach is that it generally results in more cost-efficient capital structures for the issuer. The main disadvantage is that it may exclude certain projects from being added because the resultant expected default frequency and recovery rates would violate the assumptions under which the capital structure for the CLO transaction was formulated. Additionally, the sponsor must be able to run cash flow simulations to confirm that the planned acquisition does not breach the capital structure of the transaction.

For this approach to work, the collateral manager must be fairly certain that it can fund or acquire loans that meet the expected characteristics, and Standard & Poor's must be comfortable that the procedure and underwriting standards employed by the originator will fund projects that are eligible for inclusion in the CLO asset pool.

Worst-case portfolio. Under this methodology, the CLO collateral pool at the end of the ramp-up period is assumed to be one of the worst possible pools of assets, as allowed under the Project CLO collateral pool eligibility criteria detailed in the transaction documents. Under this approach, Standard & Poor's must still rate and assign a recovery rate to each project. But projects may be included into the asset pool of the transaction as long as the "worst-case" collateral pool criteria is not violated.

This approach is viewed as being a worst-case scenario because it does not take into account that the actual expected project portfolio, at the end of the ramp-up period, will likely have characteristics that yield a lower default frequency. The benefit of this approach is that it gives maximum flexibility to adding projects as long as the worst-case collateral debt security parameters are not violated. The drawback is that it typically results in a higher level of credit support needed for the CLO transaction since it assumes that all projects additions have effectively brought the portfolio to the worst possible portfolio, as allowed by the transaction eligibility criteria. Some issuers may find capital structures achieved by this approach to be more costly. Additionally, this approach is difficult to implement in transactions that require the use of the multi-jurisdictional default model, since additional specifications must be made in regards to the sovereign ratings and maximum concentrations allowed within any one country.

To model this worst-case portfolio, the collateral eligibility criteria must incorporate a Standard & Poor's ratings distribution, a maturity distribution, a maximum obligor concentration, and a minimum recovery percentage. The Standard & Poor's ratings distribution specifies the maximum amount of collateral allowed at each rating level. The maturity distribution specifies how much of the collateral matures during each year in the future. The maximum obligor concentration specifies the amount of loans that may be due from the same borrower.

Standard & Poor's would then build a worst-case theoretical portfolio assuming that the obligor with the highest concentration will also be the one that is the lowest rated and have a loan out with the longest maturity. These assumptions would be repeated on a loan-by-loan basis to construct a portfolio that meets the ratings

distribution, maturity distribution, and maximum obligor concentration as specified by the eligibility criteria. This theoretical portfolio would then be run through the Standard & Poor's default model to establish a worst-case default frequency.

The capital structure of the transaction would then be set by running cash flows using the above worst-case default frequency and the minimum recovery percentage specified for the pool.

Reinvestment period. During the reinvestment period of the transaction, principal collections are held and used to fund or purchase new project finance loans. Such reinvestment is generally permitted as long as the transaction performs as expected and meets certain structural covenants and triggers. Typical covenants include interest coverage ratios, asset overcollaterization ratios and total loss triggers. If these covenants or triggers are breached, reinvestment is stopped and principal proceeds are used to pay down the rated tranches either in full or until the covenants are brought back into compliance.

Surveillance. Regardless of which approach is used to size that capital structure, Standard & Poor's will maintain active surveillance not only on the underling project loans, but also on all CLO transactions involving such loans. The main concern is that the default frequency, recovery rates, and cash flow characteristics used to establish the commensurate ratings are still valid. As ratings migrate and the collateral changes, Standard & Poor's may request that additional cash flow runs be made to determine that the transaction still performs at its assigned ratings. Because statistically significant data on default timing, timing of recoveries, and loss severity are still being gathered, on-going surveillance is important to maintain correct ratings on the CLO securities, especially for the ratings on the subordinated and junior tranches. Standard & Poor's expects the ratings on the junior and subordinated tranches of project finance CLOs to be more dynamic than typical structured finance securities due to the nature of the loans and structure of the CLO transactions.

Standard & Poor's will look at the trustee reports and monitor the default probability and the cash flow characteristics of the assets, the structural covenants, and the ability of the transaction to perform as structured.

Hybrid project finance CLOs. To overcome some of the concerns surrounding long ramp-up periods and negative carry on the transaction, some sponsors have proposed combining high yield corporate loans or bonds with project finance loans. The liquidity of the corporate market and the known cash flow characteristics of the assets make this attractive. Nevertheless, Standard & Poor's has some general concerns with this approach. The primary concern focuses on the ability of the sponsor to manage both type of assets. Project finance loans market is substantially different than the high-yield corporate loan market. Success in one does not guarantee success in the other. Thus, this approach must be viewed with caution.

Second, if the strategy is to hold the high-yield corporate loans and bonds until project loans become available then to re-deploy into such, this concept introduces market risk into the transaction. The sponsor may not be able to re-deploy because market conditions would may not allow the sale of corporate loan or bond assets and reinvestment into project finance loans without breach of the transaction covenants and triggers.

Master Trust Considerations

To securitize project finance loans, some sponsors are interested in structuring transactions using a master trust structure. This structure is attractive to some issuers because it is potentially more cost-effective to issue an additional series of bonds, rather than creating a new trust. Depending on the issuer, securities issued out of a master trust may be backed by one large, diverse pool of assets containing a mix of seasoned and newly originated loans. Master trusts may contain other features that benefit investors, such as sharing of excess cash flows and reserve accounts among the different series of issued bonds.

In structuring master trust transactions backed by project finance loans, the sponsors should consider the following:

Seller's interest. The seller's interest is equal to the amount of trust assets that are not matched by the correspondent trust liabilities. The sellers interest provides a buffer against two major potential risks: amounts that may be set-off and amounts that exceed obligor and industry concentration limits.

Depending on whether or not the loans documents contain provisions against set-off, Standard & Poor's will examine the enforceability of the provisions and size a commensurate amount of sellers interest to cover such risk. The sellers interest is also used to protect noteholders from obligor and industry concentrations. If certain projects exceed obligor or

industry concentration limits, such overconcentrations are allocated to the sellers interest to limit the potential exposure.

Collateral additions. Master trust structures for different asset types typically have a number of ways in which collateral can be added to the trust. They include required additions, automatic additions, and permitted additions. Since project finance loans are not homogenous assets, such required and automatic additions of collateral can not be used in project finance CLO. Standard & Poor's must rate and give expected recovery values for each project finance loan included in the master trust.

Series termination date. In master trust structures there are two important payment dates for each series: the expected final payment date and the series termination date. The expected final payment date is when a series of notes are expected to be paid out. The series termination date is the date after which the series of notes has no legal rights to any additional cash flows. Since project finance loans are not homogenous in nature, care must be used in setting the payment date for each series to cover extension risk on the loans. Standard & Poor's will work with the sponsor to set these dates to mitigate such risk.

Future Developments

It is expected that the criteria presented here will continue to evolve to reflect ongoing changes in and nuances of project finance CLO transactions. Standard & Poor's is open to examining proposals containing new structural mechanisms and will consider each CLO transaction on a case-by-case basis.

ANALYZING ENERGY TRADING AND MARKETING FIRMS' CREDIT QUALITY

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Deregulation of the energy/utility industry has brought significant opportunity and risks to the business entities competing in these markets. Energy trading and marketing firms face a continuous challenge to mitigate risks in this environment, as their business strength, areas of operations, and, ultimately, their business strategies evolve or change.

The broad areas of Standard & Poor's analysis of energy trading firms are commercial position, risk management framework, and financial risk and performance. The latter also includes the firm's capital structure and financial liquidity.

Commercial Position

Standard & Poor's analysis of an energy marketer's commercial position contains some fundamental areas similar to traditional utility analysis, yet tailored to a marketer. These areas are market presence and diversity, supply access and physical liquidity, and competitiveness, including operating costs, product pricing, and diversity. The industry's general business risk is high, given significant commodity pricing risk and expectations that marketers will speculate, hold unhedged positions, and use their market intelligence to arbitrage. Moreover, irrational competition, where new competitors enter markets, is creating greater price and volume volatility. The typical top-tier energy marketer has qualitative attributes that are only marginally investment grade because of the volatile nature of the commodities in the business. Given all this, the average energy marketer's credit quality assessment is at the low 'BB' category.

Energy marketers of higher credit quality not only provide the commodity, but also sell the optionality and reliability of their service. These firms have leading national market positions, diversity in most aspects of the business, advantages as low-cost providers, expertise in using and selling financial derivatives, and substantial physical liquidity.

Market presence. A firm's market presence, the size of the operation, and its share of sales within markets are important because there are informational economies of scale in marketing. Being at the center of the flow of data is crucial to knowing the direction of the market in the very short term.

Greater size is a positive credit factor because larger players gain more product liquidity and added knowledge of many different transactions. A fluid ability to move a commodity gives marketers a better opportunity to act on sales prospects, and creates a more accurate forward pricing curve. Smaller firms do not generally have these informational economies, and, as the market has witnessed, can be whipsawed in a changing market.

Size can be related either to sales or by the number of known active client accounts—the number of sales contracts, sales and purchase counterparties, or master swap agreements. Knowledge of a marketer's counterparties and sales contracts (including options contracts and whether these are at fixed or indexed prices) will help Standard & Poor's gauge the stability of a marketer's presence. That is, it will help when evaluating a marketer's ability to access a commodity and make a sale.

The benefit of diversity is to moderate demand swings due to regional weather patterns and other regional supply/demand mechanics. The better-managed marketers are able to take advantage of these swings and focus daily trading efforts in regions where demand is high.

Standard & Poor's recognizes that different management teams will have different tolerances toward long- and short-term transactions. A marketing firm that relies on daily trading activities for most of its revenues may be more at risk for generating sales than an entity with more long-term firm contrasts in hand.

Yet, there are greater price risks with long-term sales. Although there are other factors to consider—such as daily supply access, customer reliance on the marketer, the marketer's reliability reputation, and price risk controls—Standard & Poor's believes that a more balanced sales approach (between long- and short-term sales) leads to better credit quality.

Diversity. Another important feature of the higher-quality energy marketers is strong diversity and reliability of products and services. These companies should be able to provide either natural gas or electric power any time, anywhere, and at fixed or variable prices and volumes. It is important to understand that a marketer's customers are both the buyer and the

seller of a commodity because the marketer provides services for both parties. A key to a successful energy marketing operation is delivering exactly what the customer wants and needs: the buyer wants reliable supply, volume flexibility, price flexibility, and predictability; and the seller wants a reliable outlet for the commodity and price risk management.

The high-quality marketers do not have to provide all products and services to be successful. Yet, marketers should be highly flexible and effectively deliver product at a profitable level. To be that reliable, an energy marketer will need to be able to access natural gas and electric power at will. A savvy marketer also will be able to arbitrage each fuel, which takes extensive knowledge of the supply and demand curves in all markets.

If a marketer relies on futures contracts to make actual deliveries of a commodity, it must have strong financial liquidity. This reflects that most futures contract expirations result in financial settlements (not commodity deliveries), usually because the delivery location under the contract is not where the customer needs the commodity. In these cases, the marketer settles the futures contract (making a profit or a loss) and purchases the commodity in the spot market for the customer. If contracted correctly, the marketer should be indifferent to using the futures contract for delivery or as a pricing hedge, but it still needs the financial liquidity to close the deal.

Asset control. Given the demands and reliability requirements faced by an energy marketer, the company must be able to access a geographically diverse supply of natural gas, electric power, and other fuels, as well as transmission storage and peaking facilities. These assets are the physical liquidity of an energy marketer. The quality of these assets and the control a company exercises over them are critical drivers behind Standard & Poor's evaluation of an energy trader's business profile and credit rating. Quality relates to the cost structure, size, and location, while control reflects ownership and contractual commitment, or lack thereof.

Similar to the buy-versus-build debate in the electric utility industry, there are different issues depending on whether facilities are owned or rented. An energy marketer would have more control over a commodity if it owned gas reserves, gas storage, generation plants, electric wires, or gas pipelines. However, it would have the risk and responsibility to operate those facilities, and Standard & Poor's incorporates these factors into analyzing the credit quality at energy trading and marketing firms. Rented assets, such as purchased-power and gas contracts, tolling agreements, and commitments to use transmission or storage capacity offer less control over the commodity, but have no operational risks. However, there is credit risk; that is, the risk that a supplier will default on its obligation to deliver the commodity. Standard & Poor's will carefully evaluate the quality of a marketer's supply sources. For example, the quality of a source would be the type of generator (nuclear versus burning gas versus hydropower). A marketer that has dedicated access to a producer's gas or a generator's power may have even less risk than owning reserves or contracting for them, but is not fully without risk because the use of gas and generation can be constrained by pipeline or transmission line capacity. An example is where major gas producers buy an equity stake in a marketer and dedicated supply to the effort. These scenarios are healthy for credit quality, given the large amount of gas reserves involved and the friendly market-sensitive pricing arrangements. A less positive situation would occur if the producer had a weak business or financial position, such that delivery or price of supplies could be in question. In the renting scenario, Standard & Poor's would consider the monthly demand payments under certain contractual arrangements (take-or-pay contracts to purchase commodities, tolling, transmission, and storage) to be off-balance-sheet debts (defined as the net present value of the future obligations). Standard & Poor's analysis of these obligations will develop as energy trading firms adopt Financial Accounting Standard 133. This standard obligates companies to use mark-to-market accounting and record certain contractual arrangements as assets or liabilities at fair value.

From a credit standpoint, an energy marketer with a high level of physical liquidity should offer greater delivery reliability. However, it may also reflect inefficiency. Contrary to regulated utilities that built assets to serve the peak needs of a franchised territory, energy marketers are expected to use physical assets more efficiently over a much larger service area. In fact, Standard & Poor's believes there can be a multiplier effect for marketers that own or control gas supply and power generation. A marketer should be able to sell many times more commodity than it owns or controls if it uses its counterparty network effectively, and leverages

the use of financial derivatives (i.e., swaps, options, futures, and forward sales contracts), the liquidity of its assets, and the liquidity of the market.

For example, gas reserves are highly liquid because they can be sold virtually anywhere in North America. A well-informed marketer would follow the weather patterns and the gas demands across the country, and sell a maximum amount of gas in the highest-premium markets.

These firms should also recognize the relative liquidity of supplies—thus the relative values for commodities. This is important in gas trading because reserves in different regions sell for different prices (basis risk). Marketers without these skills will not use their own assets efficiently. In addition, the better-positioned players will have a strong ability to acquire supplies in the spot market to take advantage of demand and price swings. This is substantially more important in the electric power marketing business because most sales are on an hourly or day-ahead basis. This alone makes power marketing far more difficult than natural gas marketing.

Although Standard & Poor's generally views the presence of hard assets favorably, the only way to measure a marketer's skill at generating sales is through performance. If a marketer proves it can create more sales with less assets, then credit will be given in the analysis. Standard & Poor's believes only the largest marketers, with the greatest number of clients, are able to make this claim.

Furthermore, marketers benefit from having a large number of traders with good counterparty relations. Traders are an energy trading company's greatest asset. The depth of their experience, their ability to trade physical and financial products, and their ability to source trading information are all critical factors in an energy trading firm's competitive position.

Supply access and physical liquidity. An energy marketer's competitiveness is driven by the diversity, reputation, reliability, and market share of its products and services. A marketer with a high level of physical liquidity offers greater delivery reliability, which is related to a marketer's competitiveness. This is measured by more than just costs and prices. Standard & Poor's combines all the areas to evaluate the ability to succeed in marketing. Yet, like any other product for sale, price also matters. Pricing tends to have two components: the cost to acquire and deliver the commodity and the marketer's overhead costs.

Standard & Poor's tracks both components, but given the competitive nature of the business, these confidential numbers may never be publicized.

The hourly, daily, monthly, or long-term commodity price is usually based on the bid and the ask along a market-based forward pricing curve, where the marketer buys at the bid and sells at the ask. When the marketer is a true middleman in this transaction, it earns a "profit" on the difference between the bid and the ask. Theoretically, most trading and marketing firms' forward pricing curve will be similar to the market's curve, as all marketers should be reading all the same public information and talking with the same counterparties. However, a mismarked curve can occur if a marketer is unfamiliar with the market's load shape, or lacks a substantial counterparty base in a region, and thus does not share in all the pricing information. Firms that arrange long-dated deals beyond the known market forward price curve (usually one to three years) must commit to conservative prices. Usually this is based on forecasts of marginal costs to produce a commodity; a reserve should be established in case the market shifts against the marketer's position.

Competitive pricing also will reflect a marketer's operating costs, which can vary depending on the cost to produce power or gas from owned facilities or the fixed cost of long-term gas and purchased-power contracts. Presumably, in either case, larger marketers can receive better bulk prices than smaller players. Yet, this is not always the case—a stronger competitor will be able to achieve wider bid/ask spreads. The more sophisticated players that take advantage of demand swings and efficiently use physical assets and client relationships should earn the better profit margins.

Overhead costs eat into profit margins, so marketers that stay lean and efficient will be more price competitive—if overhead costs are low, a marketer may be able to discount more. Standard & Poor's will examine a marketer's overhead costs related to personnel, technology, office space, taxes, debt servicing, and cash dividends.

Lastly, traders are an energy trading company's greatest asset to maintain competitiveness. The depth of their experience, their ability to trade both physical and financial products, and their ability to source trading information are

all critical factors in an energy trading firm's competitive position.

Risk Management

Standard & Poor's analysis of energy trading and marketing operations continues to focus on three main areas: risk management operations, commercial position, and financial risk and performance.

The cornerstone of a successful energy trading business is its risk-management operations. Standard & Poor's analysis of risk management concentrates on management oversight of the trading business, tolerance of risk, credit policies, and the systems used to control the process. In-depth analysis of these areas helps determine a marketer's ability to succeed. Standard & Poor's considers sophisticated risk-control systems a prerequisite to investment-grade credit quality.

Management oversight starts at the top. Close monitoring of trading operations by senior executives, the board of directors, and senior officers of the trading firm's parent company (if applicable) is viewed as a critical component of managing risk. It is important that top management considers what constitutes an acceptable loss and communicates that loss tolerance via words and deeds throughout the organization. Management must mandate strict guidelines for controlling traded commodities, value-at-risk (VAR) limits, accounting procedures, and counterparty credit policies. Management should set precise guidelines defining which commodities will be allowed in the firm's portfolio, which the senior management should be familiar with, and the level of expertise and resources required on the trading floor. Standard & Poor's believes a conservative VAR calculation, a method used to determine the potential loss that a portfolio can incur, will account for all the "Greeks," i.e., the calculation should include such parameters as price change (delta), pricing curve convexity or concavity (gamma), price volatility (vega), and the speed of time decay for option premiums (theta). Management should also implement conservative accounting methods, such as mark-to-market, that will reveal the current market value of a portfolio and enable management to devise an appropriate strategy to lay off risk. Counterparty credit policies should set appropriate credit levels, not only in dollar values, but also in limits on commodity volumes. These limits should be checked regularly, optimally after each trade.

The firm's reporting structure for maintaining order and controlling risk is important to a successful operation. The board of directors should institute a hierarchy in which committees, such as a risk management and control committee, establish and recommend updates to risk-management policy. This committee should also review and recommend modifications to VAR methodologies and limits. A separate credit committee should develop and maintain board-approved credit policies, report any incidents of noncompliance, exposure to counterparties, the use of parent guarantees, and anything else relevant to managing credit risk. A structure with independent committees for risk management and credit limits is prudent, especially when both will report separately to the executive committee or the board of directors. An executive committee should participate in limiting monetary loss, positioning credit exposures, and approving the systems and procedures used for valuing and marking complex structured transactions. Furthermore, Standard & Poor's encourages continual, independent, third-party audits by major accounting and consulting firms.

Standard & Poor's analysis scrutinizes the firm's management by examining a variety of criteria, including the level of risk management background, knowledge of trading, and familiarity with derivative products. The track record is very important. Marketing firms may suffer from outsized or extended trading losses, control lapses, or fraud at one time or another. Standard & Poor's examines these instances to understand a firm's risk tolerance and the gravity with which management handles violations of limits and policies. Standard & Poor's also considers:

- Whether top management has a background in managing market risk;
- Whether management understands the risks of using financial derivatives and the necessary funding requirements;
- Whether day-to-day funding needs are actively monitored;
- The extent and frequency of performance and trading limit review by a firm's governing body; and
- What top management does to ensure that proper controls are in place before marketing new products.

Risk tolerance: managing market risk. In addition to management oversight, a key concern of risk management operations is risk tolerance, which includes market risk management and valuation.

Standard & Poor's recognizes the broad spectrum of risk tolerance in the energy marketing industry. Some organizations view themselves as being capable of providing every product to every customer, while many others are niche players. The risk in both approaches relates to how well a firm manages its open (unhedged) positions in a commodity; that is, its long or short position in volume, price, or location. Most companies claim to maintain balanced books, but in reality, this is impossible unless the traders conduct simultaneous and identical back-to-back buys and sells. Every marketer has open positions at the end of every day. A firm's risk tolerance relates to how large the open position is and the strategies for how to use those positions. Generally, many top-tier marketers try to maintain open positions of about 2% of their daily books of business. Smaller players with less financial liquidity should have less than that.

Market risk tolerance can be measured by how a firm mitigates its open position. For example, a more conservative company will purchase financial derivatives from other marketers or financial institutions at the end of the day to effectively balance out all open positions. Although this adds a cost to operations, it can reduce volatility if done correctly. A less conservative firm will focus on making physical transactions the next day that balance the portfolios. In these cases, added expenses are not incurred, but true balancing never really occurs because this activity is continual.

More aggressive players use their market intelligence to project the direction of prices or volumes in different regions to manage accordingly (arbitrage) their open positions to earn more money. Clearly, this activity can result in losses if market information is poor or if management's interpretation of that information is wrong. This is why the monitoring of daily, monthly, quarterly, and annual earnings results is so important. Standard & Poor's believes only the biggest marketers—with a great number of counterparties, a large trading operation, and sophisticated modeling systems—will be successful in these activities.

These tactics are generally related to a firm's view of market-making and physical deliveries. Most firms engage primarily in physical deliveries and arbitrage trading strategies backed by a strong ability to access energy commodities. Standard & Poor's believes the larger marketing companies will grow by offering market-making services using risk-management products (swaps, options, futures, and forward sales contracts) to customers in tandem with own-account trading.

Although market-making can be viewed as riskier than physical deliveries, both have major risks if not managed properly. The risk in market-making is selling or buying a product assuming the commodity will be available to buy (or sell) at a profitable price. Marketers expect an efficient and abundant spot market to always support this effort. Although natural gas and electric power supplies are expected to remain abundant for many years, market-making can be a stable source of trading revenue if the organization is large and has a substantial number of counterparties from which to buy and sell commodities.

The risks of physical deliveries and arbitrage are the carrying cost of assets to sell and assuming there will be buyers willing to pay prices that are profitable to the marketer. Firms with low-cost or market-sensitive access to commodities and a firm customer base may offset some risks. Again, a large number of counterparties in diverse regions enhances the ability to move products efficiently or to arbitrage.

Sometimes, it can be difficult to distinguish between the risks of the two activities, particularly if a firm conducts both. More important is a firm's risk appetite, especially when markets become illiquid. A heightened willingness to take risk (hold open positions) can send a message to traders, making it critical that the firm clearly make traders accountable for the risks they take, whether market, credit, or operational. Standard & Poor's endeavors to understand a firm's trading philosophy and whether the instruments traded are consistent with the company's customer base.

Information helpful in understanding a firm's risk tolerance and how it manages that risk includes:

- Volatility of profits and losses, particularly incidences of large, one-day trading losses or gains;
- Number and types of customers or counterparties;
- Transactions with affiliates;
- Average credit rating of all counterparties and any concentrations;
- Average length of transactions;
- Instruments traded, whether they are consistent with the firm's risk appetite and strategy, and how liquid, volatile, and hedgeable they are;

- How new products are evaluated;
- Unacceptable losses to the firm and whether the firm has a clear picture of its loss tolerance;
- Hedging policies followed and what management considers hedgeable risks;
- Arbitrage trading strategies; and
- The firm's competitive advantages, if any.

Valuation is a key element. Market risk management is one element of the analysis of risk tolerance at energy trading firms, but management also needs to know the actual market value of its portfolio and the amount the firm could lose given a sudden change in market conditions. To satisfy the first condition, management should implement conservative accounting methods, such as mark-to-market, which reveals the current market value of a portfolio, reports the daily change in the value of the trading portfolio, and allows management to devise an appropriate strategy to lay off risk.

To help measure market price risk, trading limits should be correlated to the VAR. VAR is a quantitative method used to determine the potential loss that a portfolio can incur. Standard & Poor's encourages the use of VAR models, but not as an absolute dollar measure of market risk (because firms calculate VAR differently and use different assumptions for the time it takes to liquidate the trading portfolio). Firms that assume one- or two-day closeout periods may not be incorporating the right amount of time, especially as market liquidity tends to dry up in times of stress.

In addition, most VAR model results are calculated to within a 95% confidence level, meaning the calculation covers two standard deviations from the mean value of the portfolio. Stated another way, there is a 95% probability that any change in the portfolio for the period used will not exceed a specific value. However, this also means there is a 5% chance that something may occur that could exceed a firm's risk limit. VAR models are tricky because of the incredible number of parameters to consider for an accurate assessment, such as price, location, transportation costs and capacity, and optional commitments. Standard & Poor's believes that any marketer using unsophisticated or partial VAR models is fooling itself and may be surprised by large losses.

Keeping this in mind, Standard & Poor's views VAR more as a good management tool to measure the change in market risk from one period to another, not the market risk itself. While some technical systems can use a number of approaches to determining VAR, such as correlation method, historical simulation, Monte Carlo simulation, or some other methodology, it is equally important how management reacts to and uses this information. In addition, the VAR calculation should be frequently monitored and estimated, as well as disaggregated into such different components as commodity, length of contracts, and regional exposure.

Standard & Poor's prefers to review the daily profits and losses measured against the VAR results. Strong marketers should be able to withstand extraordinary events in the marketplace. This means remaining fully operational and with adequate financial liquidity during events not comprehended in the VAR calculations.

Market price risk can also be controlled by setting volumetric limits at individual traders, by commodity, by tenor, by region, and by type of exposure. Option risk exposure limits, such as vega (or volatility) limits by commodity and tenor, should also be set. Price and volatility stress tests should be run daily in the summer months for power and in the winter months for natural gas. Shock testing can run less frequently, but trading and marketing firms should have this capability.

Importantly, all valuation models and methods must be consistently validated and tested. Firms that employ an experienced quantitative staff to perform these tests are apt to be more successful over the long term.

Credit policy's role in managing risk. A successful energy marketing company manages risk by skillfully managing assets and liabilities, and by developing sound credit procedures to protect itself from nonperformance on a counterparty's behalf.

Over-the-counter transactions with specific counterparties constitute a significant portion of the business of energy marketing firms. Energy trading, as opposed to financial market trading, involves physical delivery of the commodity. Moreover, power has additional complexities of being nonstorable and transmission-constrained. These characteristics can result in electricity pricing volatility, as reflected by power prices rising as high as $7,000 per megawatt hour (MWh) and several contract defaults during the summers of 1998 and 1999. This pricing fluctuation, coupled with the weak capital structure that is typical of most marketers, makes it necessary to scrutinize each counterparty's credit profile.

Exposure to credit risk is controlled by setting standards and limiting explicit dollar trading limits by counterparty, commodity, tenor, and region, along with explicit volumetric limits by the same variables, especially for counterparties with lower credit ratings.

Fundamental to assigning dollar limits to trading accounts is the underlying methodology, or the benchmarks used to determine the level of exposure. There is a broad spectrum of policies, each with its own degree of risks. Standard & Poor's views a "cash on the barrel head" approach as having the least amount of risk because the counterparty has prepaid for the commodity. Thus, a firm's exposure is essentially confined to volumetric limits. Extending a credit line based on a percentage of equity or historical free cash flow has more risk.

Also, when setting dollar trading limits on counterparties, several components should be analyzed. First, trading limits with counterparties should recognize outstanding receivable balances. Ideally, this should be done automatically by linking the accounts receivable system to the trading and risk management systems. Another consideration is the replacement costs of the proposed contracts. This factor must account for the difference in the contract price relative to the current market value (another reason to support mark-to-market accounting practices). Credit policy should also account for potential price increases due to market volatility that will significantly increase replacement costs.

Volumetric limits are essential because large price increases can bring a counterparty's account over its credit limit. This also can affect internal risk policy in that, if this situation arises with numerous counterparties, it could violate the firm's VAR limit. The combination of dollar and volumetric limits could have helped more than a few firms dealing with noncompliant counterparties during the peak pricing periods in 1998 and 1999, when large commodity price swings increased contract prices and exceeded many set credit limits.

Credit policy at an energy trading and marketing firm should also include an examination of a counterparty's exposure by region. Due to generation capacity and transmission constraints, physical liquidity is as important as financial liquidity for energy trading and power marketing. A counterparty may have sufficient generation to meet a firm's credit criteria. If this generation is not in the same region as the contract exposure, the counterparty may have a physical liquidity shortage in a period of high demand. Even if the counterparty meets an asset test, credit policy should dictate the level of exposure to any one region. High concentration in one region makes the portfolio vulnerable to that market's conditions, which creates a higher business risk. Naturally, some marketers deal solely in a specific region, which allows them to amass a great deal of expertise in that region. This strategy may mitigate some of the regional concentration risk. However, these types of companies tend to be small or have weaker financial profiles. Larger, higher-profile marketing firms tend to be able to access a larger number of counterparties in all regions, which supplements physical liquidity.

Most important, however, is conducting daily monitoring of the actual and potential exposures by counterparty, commodity, and region. Current risk exposure is measured by using mark-to-market accounting, while potential exposure employs a market VAR approach by counterparty to limit potential loss to a firm from a counterparty's defaulting in the future. In all cases, immediate reporting of credit violations to management and speedy institution of remedial measures should be undertaken.

Control systems to control the risk. The final critical element of an energy trading and marketing firm's risk management is its control systems. These include the structure, staffing, procedures, and technical ability necessary to prevent lapses of risk management. Examples range from internal structure credit-risk management, management reporting systems, trade processing and operations, and accounting, disclosures, and contract documentation.

Strong internal organization with systematic accounting and approval for every transaction is an important feature that helps encourage the control of risk. Generally, risk management functions should be structured and staffed to maximize accountability and communication. The proper structure of a marketing organization would include true separation, or "fire walls," between the traders (or the front office), the back office (accounting, cash management, transaction settlement, deal confirmation, contract management, and administration), senior management, and the internal credit department. The appropriate reporting lines ultimately should have the senior executives in charge of the front office, with the back office reporting to the firm's president or chief operating officer. The credit department typically reports

directly to the chief financial officer. This structure helps avoid collusion between employees (or departments) who originate transactions and those who account for transactions. In addition, the credit department must be able to report confidentially to the board of directors if it uncovers developments that threaten the integrity of the firm, such as collusion or departures from policies.

The internal credit department should be physically separated from the trading floor to further avoid any compromise of its separation from transaction origination and accounting. The credit department should conduct credit analyses on all counterparties and establish credit exposure limits, monitor all risk positions to ensure that the firm is staying within stated exposure limits, and calculate VAR exposures to help senior management formulate strategies for the portfolio. The credit department should be given broad policy, procedural, and dispute resolution powers, and should regularly report directly to the board of directors with violations of policy, VAR calculations, periodic portfolio balances, or the occurrence of extreme risk positions.

The back office carries out a variety of trade processing (record-keeping), confirmation, payment, and reconciliation functions. Back-office control functions can be underappreciated by those at the head of a corporation. Risk-averse marketers place a high value on back-office operations. The separation of these functions from the traders' influence is fundamental to the risk-control environment. Also, a firm should impose accountability for overseeing these activities, which means ensuring that transactions do not fall through the cracks.

A fundamental issue that cuts across control functions is how controls are adequately imposed on overseas or even separate domestic offices. Branch offices are difficult to oversee. Centralized and automated risk measurement, position monitoring, and trade limit enforcement create an environment in which communication is established and accountability for visible risks can be enforced.

Credit risk management, as the term applies here, refers to a trading firm's evaluation of its credit make-up and the current dollar exposure of its counterparties. These parameters indicate the level of risk a firm is willing to take on and whether exposure is concentrated. In addition, the board of directors should set predefined limits on how much exposure the firm is willing to take on within each rating or scoring category. Some firms set credit limits indexed to a particular credit rating and require guarantees or other forms of collateral before doing business. Standard & Poor's also encourages the use of netting agreements, whereby receivables and payables to the same counterparty are netted monthly to limit the exposure to counterparties.

Management reporting is another critical operation within control systems. It is important that senior management be informed daily of the profit and loss, risk exposure, credit exposure, and exceptions to policy. Reporting should break down dollars, volumes, commodities, regions, and other variables of exposure. The level of daily profit or loss at which the chairman or CEO of the parent company is notified provides a sense of the strategic value that is placed on this business segment.

What it takes to keep control. Standard & Poor's considers sophisticated computer systems essential to controlling a firm's risk. A system that keeps track of all transactions (credit, trading, and other limits) and performs exposure calculations daily requires very sophisticated computer equipment, software, and technical support. Marketers should be equipped with systems that model transactions and keep track of shifting market prices, demand, and inventory. A fundamental system informs a trader of trading limits and the appropriate pricing of a transaction. Its analog would link accounts receivable information with trading programs, prohibit a transaction that exceeded any limits, and require all authorizations to complete a deal. An even more sophisticated system would calculate all risk positions and forward pricing curves on a transaction-by-transaction basis. In addition, all branch office transactions and multiple trading sites should be linked to one trading and risk management system to timely capture the full risk exposure and hopefully limit or prevent any rogue trading.

Standard & Poor's not only considers these features in our analysis, but also the system's origin. If it is internally developed, the firm should have a sizable in-house technical staff that provides operating support, as well as developers who can provide upgrades. A purchased system should come from a well-established software maker that provides support and upgrades for its products. Standard & Poor's considers purchases of tailored packages from small "boutique companies" to be more risky because these types of businesses are more

likely to fold. This would leave the marketer without support and upgrades, thus forcing the firm to "fly blind" or invest in a new computer system.

Within this area, Standard & Poor's also focuses on system safeguards, security, and especially disaster recovery. A better-positioned marketer has a secure off-site backup facility to provide contingent operations if a natural disaster knocked out all information technology and communication systems at the firm. This is extremely important so that open or unmatched positions can be monitored and closed out, if necessary, to avoid significant losses.

Another analytical factor concerns system procedures, manuals, and documentation for all trading and marketing functions. This includes not just risk and credit policies, but also processes such as counterparty confirmation, broker confirmation, discrepancy reporting, and the like. A complete set of system and process procedures also facilitates training new employees.

Strong trade processing and operations are critical to the success of an energy trading firm and are a key component of Standard & Poor's analysis. Firms that rely on just historical, fundamental, or technical data to make trades can be successful, but companies that employ all these factors in their trading decisions are apt to be more successful.

Standard & Poor's looks to ensure that the integrity of trading data is maintained throughout the process. A series of checks and balances should be conducted for every transaction and for the entire portfolio of activity. For example, each transaction should be approved by a trading desk supervisor; the back office should confirm pricing and volume, and ensure that deliveries are made; the credit department should determine if trading or credit exposure limits were exceeded; and senior management should review transactions that exceed any limits.

It is important that no one but the trader inputs transactions. But, it is equally important that only the midoffice personnel make changes to deals in the risk management and trading systems. All trades should be verbally confirmed by the midoffice the same day and confirmed in writing by the next day. The midoffice staff should be responsible for the accuracy of all positions and perform daily verification, calculation, and reporting of positions and value. Pipeline imbalances, which have caused headaches at many firms, should also be addressed promptly. Despite the possibility that increased staffing for the reconciliation and confirmation functions can eat into already thin profit margins, inadequate staffing can be disastrous.

The risk-control system and trade system, if they are different, should be systematically reconciled daily. Tape recordings and data imaging helps reconcile the trade settlement process if discrepancies appear.

Lastly, although the back-office and midoffice personnel have distinct functions from the traders, it is beneficial that all staff be cross-trained to fully understand the complete cycle of a trade.

Capital Structure

The proper capital structure is fundamental to a firm's long-term financial viability. Given the diverse mix of players in the energy markets, a single optimal capital structure may be limiting. Energy marketers have several distinguishing factors that make it difficult to compare each other on the same scale, especially risk-management practices.

To facilitate the analysis of risk management, Standard & Poor's has adopted a framework developed by PricewaterhouseCoopers LLC (PWC) that is well suited to consider the inherent difficulties of managing risks of all types. This framework consists of four integrated levels: strategy, process, infrastructure, and environment.

Moreover, to capture the different dimensions in the analysis of a trading firm's capital structure, Standard & Poor's, together with PWC, established a common scale. The marketer's activities should be considered according to a risk-adjusted measure of capital reserved for risk purposes. Risk adjustment of assets occurs along three base dimensions: credit risk, market risk, and operational risk. Capital should also be established for general obligations, such as broker deposits, inventory, working capital needs, and capital expenditures. Although allocating capital for market and credit risk is common, operational risk is a fairly new practice, especially in energy.

The first, and possibly the most important, consideration of a marketer's capital structure is its business strategy and risk appetite. A prudent risk-management framework begins with a precise statement of the marketer's business mission, objectives, and strategies; as well as a clear identification of the risks to be taken and the expected returns associated with those risks.

Different business strategies require different degrees of sophistication in the risk-management program to support the business objective. Characteristics that help describe the marketer's risk appetite are the amount of product, or commodity, diversification, the level of hedging using forward and futures markets, and the desire to adopt risk mitigation approaches to reduce operation, credit, market, and other risks. A clear risk strategy will not allow ambiguity in risk limits or targets. Marketer's strategies can be categorized into three buckets: low risk, moderate risk, and high risk.

Low-risk strategy. A marketer with a low-risk strategy is much like an extension of the traditional utility practice. In this case, the marketing group is delegated to manage load/supply and physical assets such as generation and transmission. They sell power when short-term prices are above incremental costs of generation. This strategy is unlikely to create large market exposures because only the excess capacities are sold on a short-term basis. Effectively, controlling and managing physical assets give a marketer more flexibility to control market price risks. The optionality embedded in these assets can be deployed to absorb shocks from unexpected market events.

Moderate-risk strategy. A marketer with a moderate risk strategy is generally an unregulated energy marketing arm of a utility company and independent power marketing firms. This group sells energy by engaging in long-term contracts when the premium is sufficiently higher than marginal costs of generation. This presents two types of risks: First, the market price of contracts committed may rise even higher in the future. Second, the uncertainty of generation and demand is greater the further away from actual delivery. Demand may increase faster than forecast, creating exposures to uncertain market prices to cover loads.

High-risk strategy. A higher-risk strategy is often taken by a trading entity whose operation is an aggressive marketing center. Because trading commodities typically earn lower margins in liquid markets, to contribute significant earnings the firm must either trade large volumes of contracts, enter into substantially speculative positions, or both. A firm that trades energy as a commodity and does not control any physical assets is apt to apply this strategy.

Capital requirements. Once a firm's strategy is determined, it can then begin to develop the capital requirement that fits with the company's risk profile. In summary, measuring risk along the three dimensions (credit, market, and operational) helps determine how much risk capital should be allocated to the various functions of an energy marketer. A marketer with a proven ability to hedge open positions would recognize lower market exposure; in addition a marketer with a robust credit risk management program could reduce its credit exposure. Likewise, less risk capital would have to be allocated to cover operational risks for an experienced marketer with an exceptional record of physical asset management.

After determining a firm's business strategy and "comfort level" within the business risk spectrum, one of the three factors used in evaluating the financial profile and capital structure of an energy trading and marketing firm is the amount of credit risk capital required to cover counterparty exposure. Some of the variables that affect this component of total capital are the marketer's distribution of counterparty exposure, the types of product it trades, as well as regions of activity, and the tenor of contracts.

Credit risk reserves. Credit risks arise because energy marketers contract bilaterally with counterparties that may default on their responsibility to pay for the receipt of physical goods. In addition, counterparties may engage in "contract frustration" by complaining about the quality or timeliness of delivery, and questioning the legal foundation of contracts.

Calculating an appropriate amount of credit risk capital first entails an evaluation of a firm's counterparties, by subsequently assigning a score or rating to each and examining the total credit lines that exist at each credit class. Applying Standard & Poor's default risk probabilities by rating category to these amounts produces a

Table 1

Credit Risk Capital Reserves

Rating category	Credit limit (mil. $)	Default probability (%)	Capital at risk ($)
AAA	200	0.00	0
AA	150	0.01	15,000
A	125	0.04	50,000
BBB	100	0.21	210,000
BB	50	0.91	455,000
CCC	25	20.93	5,232,500
Total	650	—	5,962,500

weighted average credit exposure. The table displays a hypothetical counterparty profile and employs this methodology. Standard & Poor's calculates this value using a one-year default probability. It is believed to be the most representative, to reflect the variety of origination and forward contracts, as well as monthly natural gas day-ahead and hour-ahead power deals.

Although the simple calculation determines the capital at risk due to defaulting counterparties, it does not capture liquidity risk; the need to cover short positions, or the risk to the bid/ask spread when a counterparty defaults. These are embedded risks.

In power markets, it is widely believed that defaulting counterparties drove the market turmoil during the past three summers rather than fundamentals of electricity supply. When downstream players entered the market to purchase power at above fundamentals, this only exacerbated the damage to additional supply agreements.

The appropriate amount of risk capital should incorporate these embedded risks. Moreover, it is expected that energy marketing and trading firms that desire higher credit ratings should carry multiples of this credit risk.

These results could be refined by applying an ultimate recovery calculation. However, given the ambiguity of the senior rankings backing up each counterparty's credit, it is more conservative to assign a low ranking to the portfolio and assume no ultimate recovery or payment of liquidated damages.

Commodity transactions usually incur greater credit risk for counterparties than analogous financial deals due to the implicit extension of credit between physical delivery and financial settlement. Application of fixed-income techniques to estimate probabilities of default is evolving and gaining rapid acceptance. However, forward prices that vary based on the creditworthiness of the counterparty—similar to a corporate yield curve—are still not widely observed.

However, it is Standard & Poor's' view that it is just a matter of time before the energy trading and marketing business matures to a level where there is strong liquidity in all traded commodities, and that the sector begins to offer premium pricing based on credit ratings, not just based on volumes.

Market risk reserves. The capital reserve component most associated with energy trading and marketing firms is market risk capital. The first step in determining what level of capital reserve to maintain for market risk entails knowing the size of the firm's trading portfolio. This best approach is mark-to-market (MTM) accounting. MTM is a conservative accounting method that will reveal the current market value of a portfolio and allow management to devise an appropriate strategy to lay off risk.

The essential elements for performing MTM on commodity portfolios are forward pricing curves and volatility term structures. Typical marketing operations hold positions that extend beyond observable forward and option markets. In the near-term, forward price curves are developed from actual market activity observed either by the marketer's traders, or from brokers providing quote sheets. The forward curve is then often extrapolated to additional years by using the existing last 12 monthly quotes.

Volatility estimation relies on the observation of market option price quotes. In power markets, options are quoted for only about 12 months ahead. An additional complication for power markets is the existence of multiple volatility term structures due to the common practice of day-ahead and hour-ahead dispatch of generation. The additional flexibility to exercise daily and hourly options increases the value, and the risk, of holding these options.

Firms that deal in retail marketing must use an additional input essential for valuing and measuring risk of retail contracts: the load forecast. To value a retail contract, the marketer must develop an estimate of the expected quantity of energy to be consumed by their customers in the future. Usually, the forecasts are based on historical load shapes of the customer, or customer type, and are normalized for weather patterns over the observation period.

In addition, the valuation methodology for retail contracts is more sophisticated than a purely financial portfolio. Specifically, the value of the retail contract depends on the covariance between prices and loads. This requires an estimate of price volatility, load volatility, correlation between prices and loads, and a valuation approach that considers these elements in the expected value of the retail contract.

Given the number of elements necessary for the valuation of energy contracts and the evolution of market structure, it is often difficult to assign a value to a contract with certainty. Due to this uncertainty, a contract's MTM value often has a reserve account to offset the value of the contract before it is reported in the financial

statements. However, the level of reserves applied to a contract can often be very subjective. For this reason, the marketer should establish reserve accounts to address specific uncertainties with this market valuation approach.

These reserves should address market liquidity, modeling deficiencies, and regulatory issues. Market liquidity refers to the valuation of contracts using the unobservable portion of the forward curve and volatility term structure. Examples of modeling deficiencies include using monthly volatilities for daily exercise contracts, and not including price and load correlation in the valuation of variable quantity retail contracts. Regulatory issues consider the dynamic nature of evolving regulation in various regions of the U.S.

From here, a firm can determine its exposure to market risk and set a capital reserve level appropriate for the firm's strategy. The most common way for a firm to determine its level of reserve is to use a value at risk calculation. There are a number of VAR methodologies that can be used. The three most popular are Monte Carlo, covariance, and historical simulation. Standard & Poor's views the Monte Carlo technique to be one of the most useful evaluations because it can account for derivatives such as options. Option curves are nonlinear due to their "time-decay" component. The covariance method cannot account for the nonlinearity of options contracts. However, this approach may be appropriate for firms that conduct purely physical trading. The historical method can only model market risk if the market repeats historical patterns. Standard & Poor's considers this method the least accurate.

Operational risk reserves. In addition to having sufficient capital to cover credit and market risks, a firm should have capital on hand to account for the operational risks associated with a trading operation. Operational risks are the probability that an operational constraint or failure will frustrate the execution of normal market procedures. Examples include transmission constraints, generation outages, computer or telecommunication systems failures, human error, ambiguous policies, the accuracy and comprehensiveness of reporting methods, and essentially any circumstance that could halt a business from functioning properly, including ambiguous corporate policy. This possibility requires marketers to have contingency plans to meet physical delivery commitments and perform the marketing and trading function. Standard & Poor's urges all companies to develop more comprehensive policies and procedures for identifying and mitigating operational risks, because this is a relatively new area of assessment.

Not only must a firm identify operational risks associated with the physical delivery of energy products, it must be aware of the trading side's pitfalls.

One way to measure a portion of trading operational risk is to first determine the total number and total value of trades for the year. This would include sales and purchases. Next, analyze the types of errors made at the firm over the past year or two. Major errors are those that terminated trades, minor errors are those that delayed trades. From this, determine an error rate and multiply this by the total value of trades. Generally, Standard & Poor's would calculate a worst-case scenario, and then suppose some percentage of trades that delayed operations could also have terminated them. Also keep in mind the same multiple strategy applied to the previous capital components.

Other capital needs. This figure should then be adjusted again for capital expenditures associated with emergency replacement equipment and estimates of disaster recovery expenses.

The amount of capital necessary to support the trading operation should also include the general capital needs noted here. Broker deposits are necessary to cover margins on physical delivery or open positions. Capital may also be needed to purchase commodity inventories, such as natural gas storage. Working capital needs (or short-term capital) are another class of capital to account for. A conservative approach would take the worst accounts payable position over the past 12 months. This could be adjusted down for payables to a parent company (assuming there is leniency on payment terms), and adjusted up for an expected increase in business. Finally, capital is needed to cover capital expenditures for office furniture, computer equipment, and office space to accommodate current and expected growth of operations.

In summary, measuring risk along the three dimensions (credit, market, and operational) helps determine how much risk capital should be allocated to the various functions of an energy marketer. A marketer with a proven ability to hedge open positions would recognize lower market exposure; in addition a marketer with a robust credit risk management program could

reduce their credit exposure. Likewise, less risk capital would have to be allocated to cover operational risks for an experienced marketer with an exceptional record of physical asset management. Therefore, an energy marketing firm should develop a capital structure around its stated business strategy and the level of risk it expects to incur in the three functional risk categories.

Liquidity is Key

A healthy equity layer, relative to a firm's risks and obligations, is supportive of energy trading and marketing company's credit quality. But, Standard & Poor's takes the analysis further and examines a trading firm's liquidity, specifically its cash position.

A high-quality firm has a very high percentage of liquidity coverage. This translates into a strong cash position and access to bank lines. Bank credit facilities are also important to finance day-to-day transactions, providing the facility can be paid down without causing financial and additional credit pressure. However, credit lines dry up fast during times of stress. Thus, cash is viewed more positively than credit facilities.

The ability to access cash may be the most important financial characteristic. Cash is needed to settle transactions and to purchase supplies daily and to make monthly demand charge payments. Also, cash provides the means to meet broker deposits and maintain working capital when there is a disconnect between the timing of payables and receivables. Access to cash is especially critical in the event that a physical delivery cannot be made or is terminated, or when a futures or derivative transaction is made as a price hedge. Also, volatile energy markets can cause large price swings, which affect the value of trading position, and, therefore, cash calls for maintenance margin payments. Moreover, strong financial liquidity is necessary to deal with extraordinary events not factored into the value-at-risk calculations.

So the question now becomes, How much is enough? Obviously, enough cash to cover working capital needs is a prerequisite for a solid credit profile. But how much more cash is needed to cover all the unexpected events. This is an issue that would stem back to the types of risks a firm has accepted.

Capital structure is a major component of financial risk and performance. When examining a marketer, Standard & Poor's considers the risks associated with counterparty exposure, portfolio exposure, operations and general capital needs. Once Standard & Poor's quantifies these risks, they are compared with the company's equity layer. The ratio of risks to equity is the foundation for determining an energy trading firm's financial profile. Given that a trading firm's obligations are more contractual than actual debt, this method fits better than the traditional analytics.

Margin calls increase need for liquidity. Standard & Poor's analysis of energy trading and marketing firms' liquidity position relative to the firms' risk profile (credit risk, market risk, and operational risk) and capital reserves has been heightened due to the increase in maintenance margin calls in the industry.

Typically, energy marketers enter into two basic types of transactions: cash trading and long-dated structured deals. Cash trading, for the purposes of this article, is considered to be proprietary trading of energy and energy-related commodities with cash settlement. This type of trade is an integral part of an energy marketing and trading firm's operations because it is predominantly speculative in nature and presents the best opportunity for profit. Therefore, ample liquidity, or working capital, is fundamental to the viability of this business strategy. Without the capacity to settle proprietary trades financially or make broker deposits when called upon, an energy trading firm will quickly get shut out of the market by its counterparties.

Generally, long-dated transactions tend to be bilateral contracts that have deal-specific terms and are not found on exchanges. In late 2000 and early 2001, events in the energy markets have stirred interest in issues related to long-dated structured transactions. One of these issues is whether a trading firm's counterparty can make maintenance margin payments. Or, to put it another way, how does a counterparty's working capital position affect an energy trading firm's market liquidity?

Long-dated structured deals typically involve granting a counterparty an unsecured line of credit with a threshold limit. The threshold limit varies from counterparty to counterparty and is based on perceived creditworthiness (or actual public credit rating). Once the threshold is set, the MTM value of a deal determines if there is a need to post maintenance margin. This occurs when the true MTM value of the transaction exceeds the credit threshold. When prices are volatile, MTM values can swing widely and create the need to post margin.

Margin calls often are met with an increase in a performance guarantee. However, due to the late 2000/early 2001 credit events in the energy industry, more firms are seeking cash, letters of credit, or government securities to cover margin calls. This pressures a firm's liquidity position and the need for cash reserves, liquidity facilities, or commercial paper programs.

Firms that lack this liquidity could "game" the system, to some extent, through contract frustration. This tactic could buy a cash-strapped firm time to muster the funds needed to make margin calls by disputing the terms of a contract, such as the valuation methodology, terms of delivery, or quality of the product. Here's an example of how this could occur:

Party B is selling to Party A and buying from Party C (Party B has no physical liquidity). Party B sells a futures contract to Party A, which becomes "deep in the money" and breaks B's threshold. Party A asks B for maintenance margin to fulfill master trading agreement requirements. Party B turns to C and asks for the same maintenance margin call because this position is now deeper in the money. But, C disputes the valuation of the contract and refuses to pay maintenance until this matter is settled. Resolution could take weeks, but the maintenance margin to A is required immediately. This scenario is a potential liquidity crunch for B.

For B to avoid a problem, the firm must reserve enough cash to cover its margin obligations or keep credit lines available. In the latter case, the marketer must have the ability to pay down those lines, in a timely fashion, or suffer a loss of credit quality, which reverts back to the need for a strong cash position. The same argument applies to a firm that issues commercial paper to fund operations. Commercial paper needs a back-up facility to support remarketing, which, if used, needs cash to pay off any open balance.

Therefore, Standard & Poor's will further review the capital requirements criteria for an energy marketer and determine an appropriate liquidity position relative to a firm's risk appetite and capital reserves.

TELECOM PROJECT FINANCING

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Telecom infrastructure investment continues to grow at a rapid pace due to deregulation, technology gains, and increasing competition, as well as a growing use of third-party debt. While supporting industry growth, these drivers also contribute to a rising level of credit risk in many telecom transactions.

Rapidly expanding infrastructure, coupled with increasing competition, has led to unstable service prices, and therefore, uncertain cash flows. Rising credit risk is also driven by the growing complexity of transactions and the debt burdens that they carry, usually to quickly establish large networks. These networks routinely cost billions of dollars and that take years to build out. In response, lenders are looking for improved credit quality in many of these transactions, through a better allocation of risk or a lower risk profile.

In response to these trends, Standard & Poor's expects that some sponsors will increasingly rely on transaction structures that limit recourse to the sponsors' balance sheet; that can attract large amounts of debt; and that provide lower level of credit risk. Project finance structures, which in part use nonrecourse debt, are well suited to meet these goals. Although many telecom deals employ nonrecourse debt and are thus considered projects, they often lack some key features of traditional project finance that help to mitigate some credit risks. These features include strict limitations on asset composition, activities, debt, and distributions, as well as substantial liquidity facilities and bankruptcy remoteness from sponsors. Given the growing risk levels in the industry and a renewed investor interest in credit quality, Standard & Poor's expects that sponsors will increase their use of traditional single-asset project finance structures for their long-term telecom investments.

Industry Trends

The demand for telecom services remains driven largely by the need for basic service in much of the developing world, the rapid growth in wireless communications, and customer needs for increasing transmission bandwidth and speed to support explosive growth of the Internet and new data applications. Demand is strengthened by declining prices in some key industry services, such as switched access, long distance, and undersea cable capacity.

Favorable developments in deregulation and technology, along with market liberalization and use of third-party debt, better enable suppliers to meet this explosive demand growth. Regulatory changes have occurred mainly through privatization of the incumbent in many PTT-style systems and by market liberalization. As recently as a few years ago telecom was, for the most part, a monopoly industry, highly regulated and therefore highly politicized and, in most countries, owned by the government. Regulators controlled the capital structure of the provider, often limiting infrastructure growth while maintaining a monopoly system. Increasingly around the globe, however, this type of regulatory framework is evolving toward a procompetitive structure that helps to remove supply barriers. Data from the International Telecommunications Union (ITU) indicate that from 1991 to 1999, the number of countries with state-owned incumbents fell from about 150 to fewer than 100, while the number of telecom industry regulators grew from 12 to 84 (*see Chart 1*).

Market liberalization is reducing monopoly controls of telecom service by allowing varying levels of competition. Cellular and Internet service provider (ISP) markets are most open to competition. Unbundling of the local loop—the critical piece of the network that connects the customer to the local exchange carrier's network—is further inducing competition; nevertheless, about three-quarters of the global market for local basic services markets (fixed-line) remains fairly closed. Local competition is increasing, however, most notably in the U.S., where the Baby Bells and long-distance service operators are beginning to compete directly for each other's traditional services.

Transmission advances continue to enable providers to expand the telecom infrastructure capacity through new systems and improvements to existing assets. The wireless telecom sector has attracted much investment in recent years, with a focus on cellular and personal communication systems. Applications now enable supply of new and potentially

expansive offerings, such as wireless data for the Internet.

The wireline sector is also benefiting from technology gains. The global growth in terrestrial and undersea fiber optic cable systems is supported by new and better multiplexing technologies that provide much greater bandwidth. New wavelength division multiplexing techniques and equipment allow for fiber-optic transmission rates of 1.1 terabits per second along a single fiber.

Technology gains also help providers upgrade existing assets and thereby improve their competitive position. Cable companies are providing business and residential customers with high speed Internet connections by using transmission technologies for existing coaxial cables. Local exchange carriers are competing for this same market through digital subscriber line (DSL) technologies that greatly enhance the transmission capacity of exiting twisted copper wires.

Technology gains, however, can have material credit effects on telecom deals because they can place downward pressure on key prices. For example, capacity prices on undersea fiber cables are declining at a brisk pace—around 20% to 25% per year. These trends suggest that some telecom services have or could take on commodity characteristics, and thus associated credit risk profiles.

Business responses to these industry trends include entering into global partnerships and undertaking merger and acquisition activity, in order to extract value from perceived synergies, gain access to foreign markets, or establish a national or large cross-border presence. Prime examples of recent merger and acquisition activity include AT&T/TCI/Media One; MCI/WorldCom/Sprint; Qwest Communications International/U S West; and most recently America OnLine/Time Warner and Vodafone/Mannesmann.

Another important business response is the growing size and complexity of telecom projects, as providers strive to rapidly build national and space-based networks costing billions of dollars. These dynamics often increase construction-related risks because most transactions rely on uncertain precompletion revenues and on additional lending to complete buildout.

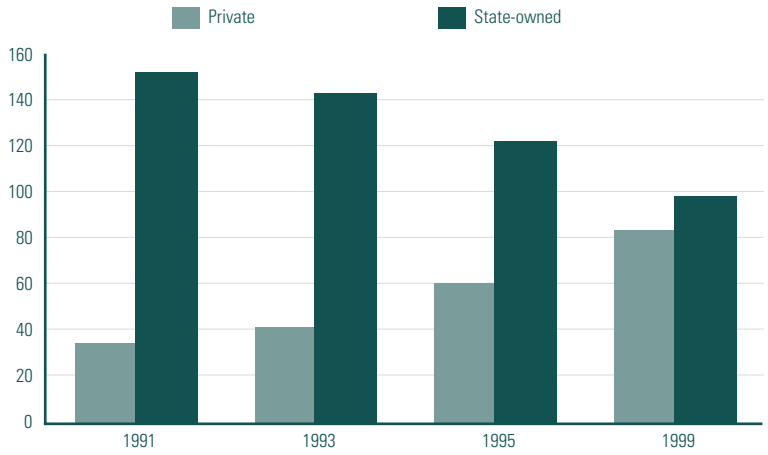
These collective forces of increased competition, technology gains, and more complex and larger transactions serve to increase the potential for credit default. The bankruptcies in the summer of 1999 of Iridium and ICO Global Communications illustrate several important project risks. Iridium, a low earth-orbit mobile telecom systems that began providing service in 1999, failed to attract a sufficient subscriber base for its premium-priced services. Following Iridium's high-profile bankruptcy, ICO Global Communications, another global satellite communications systems, failed to secure additional lines of credit to complete its buildout, and promptly followed in Iridium's footsteps.

Project Debt as One Financing Alternative

The growing use of third-party debt also supports industry growth. A large amount of this

Chart 1

Privatization Trends of State-Owned Telecom Companies



borrowing has been structured as project finance debt for several reasons. Project finance facilitates joint ventures, limits recourse to sponsors, enables access to a wider pool of investors, and can, with appropriate structural features, lower a transaction's risk profile and capital costs, thus improving equity returns. Statistics from Capital DATA suggests that in the five years from 1994 through 1998, telecom project debt was about $121 billion, mostly in the form of bank debt. In the same period, the average project size rose to about $500 million for bank loans and $400 million for capital market debt (*see Charts 3 and 4*). Most of these transactions, however, likely involve only light structuring of corporate entities rather than traditional project finance structures in which asset composition, debt, activities, and equity distributions are well restricted.

Many sponsors have not heavily structured these transactions to mitigate most lender risks, most likely because of the regulatory and technological uncertainties, but also to avoid compliance with strict covenants that might otherwise restrict involvement in other business opportunities. But Standard & Poor's expects that the growing level of industry risk and a renewed lender focus on risk will lead some sponsors to increasingly use single-asset project finance structures that control the transactions' credit risks.

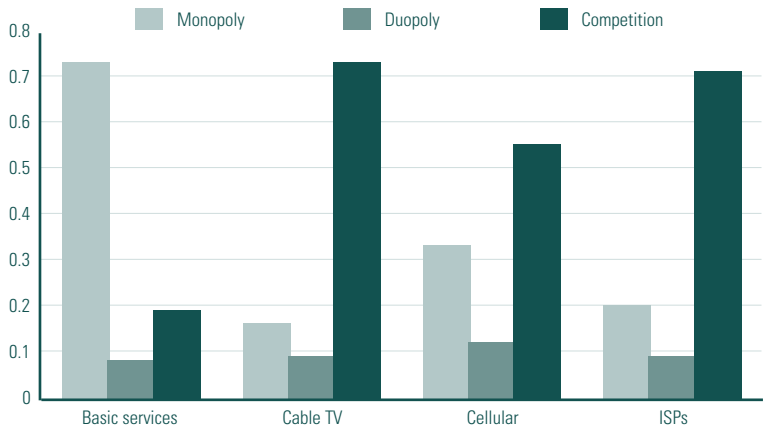
Table 1

Project and Corporate Debt Comparison

Project finance debt	Corporate debt
Limited asset life	Indefinite asset life
Single asset	Multiple assets
Non-recourse	Recourse
Pledge of collateral plus revenues	Unsecured debt
High leverage	Moderate leverage
Stable cash flows	Unpredictable cash flows

Chart 2

Share of Services Under Regulation



Projects Versus Corporations

The differences between project and corporate finance transactions are important. As shown in Table 1, corporations generally rely on multiple assets in diverse regions and/or industries to repay moderate levels of debt that enjoy unsecured recourse to a company's assets. Projects, in contrast, are highly leveraged with nonrecourse debt, and rely on a well-defined asset to meet high levels of debt by generating stable levels of cash flow. The project's single-asset nature requires that limitations be placed on activities, additional debt, changes in contracts and distributions to equity, and that liquidity reserves be available to support debt servicing in times of temporary stress. Project structures also provide lenders with a more comprehensive security package.

Project Criteria

To determine the credit risks that are presented to lenders to a telecom project financing, Standard & Poor's analyzes six project components:

- Markets and competitiveness;
- Regulation and competition;
- Technology and construction;
- Operations and marketing;
- Financial performance; and
- Legal and financial structure.

Markets and Competitiveness

Markets. In assessing the potential demand for a project's offerings, Standard & Poor's examines several key indicators whose overall importance depends on the market being studied. These indicators may include economic growth, sector growth (e.g. Internet and data), the mix of residential and commercial customer bases, teledensity levels, and the ratio of incoming to outgoing calls (especially for emerging markets). Demographics are important for developing country projects in assessing the potential that population groups will be able to afford service. Demographics also help identify the size of

upper income groups that are better telecom users in terms of minutes of use for enhanced services. Depending on the complexity of the demand analysis, Standard & Poor's may require an independent market review performed by an expert consultant.

For wireline projects, teledensity statistics measured in lines per 100 inhabitants, and particularly measured in business districts, at least give an indication of gross demand. A concentration of businesses in the service area is favorable because these businesses are the most lucrative customers and are often undeserved regarding voice telephony, data and other high-speed application needs. The backlog for lines, if accurate, gives a good indication of early demand, especially in less-developed telecom markets, where the wait for a telephone is months or even year. These lines will produce the cash flow to fund the capital expenditures and working capital requirements that are greatest in the first years of a project.

Indicators for wireless projects involve a variation of wireline business risk factors, especially the concentration of businesses that are prime wireless users. The availability of landline service, specifically the installation period for wired phone, can be a good indicator for wireless product demand.

Competitiveness. Given the growth in competition, the general lack of long-term contracts, and potentially declining prices, a project's competitive position through its debt tenor will have critical credit implications. Standard & Poor's will assess the project's ability to compete in its service area based on the level of competition in the service area and on price and volume forecasts. In general, more creditworthy projects are those that can provide services at below market prices for a sustained period, without sacrificing customer service quality or system reliability.

Standard & Poor's will assess the authorized and unauthorized levels of competition in the service area. While some markets may be dominated by a monopoly provider, the actual market might contain a level of or potential for material competition. Standard & Poor's will assess the strength of monopoly positions to determine if *de jure* monopolies actually translate into *de facto* market power. Standard & Poor's will examine the presence of irregular competition, such as dial around or call back, and will gauge the potential for new competition that may be enabled by regulatory acts or new technologies, such as development of wireless Internet access and 3G systems. Standard & Poor's will examine the cost advantages of the parties under competition, and the extent of universal service obligations. Projects that have considerable buildout requirements into potentially uneconomic areas may be less competitive than those providers that do not.

Standard & Poor's will also gauge the degree to which a project can sustain declines in prices and or volumes through the term of the debt, without compromising customer service of product quality.

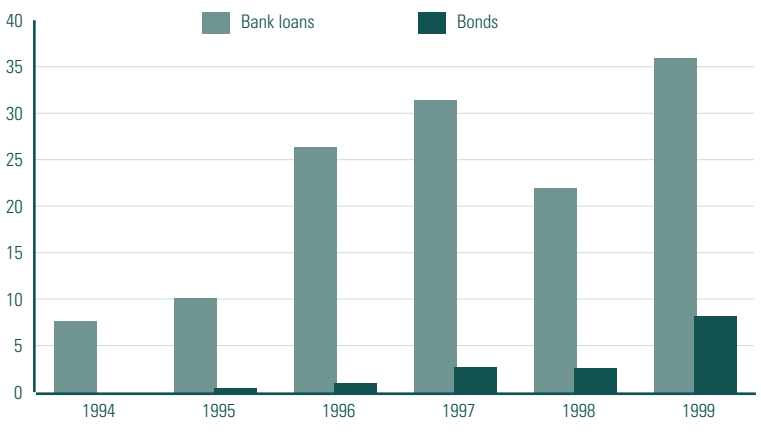
Regulation and Competition

A project's regulatory environment usually presents material credit implications, because it directly controls the level of competition and the

Chart 3

Trends in Telecom Project Debt Volume

(Nonrecourse)



Source: Capital DATA.

project's operating regime. Standard & Poor's examines the regulatory goals established for the project's service area, assesses how the tools available to the regulator may affect project cash flows, and studies the project's concession or license for performance requirements and limits to competition.

Regulatory goals vary from market to market, but usually focus on expanding the availability of basic services, improving efficiency, and lowering costs by introducing competition, or enabling the provision of higher value activities in the service area. Regulators employ several tools to meet these goals, including rebalancing rates between residential and commercial users, controlling interconnection rules and prices, deciding on universal service obligations, controlling number portability and allowing carrier preselection, and adding requirements for third-party billing. Standard & Poor's will examine how the goals and tools might affect the project's ability to meet debt service.

Concessions are reviewed for minimum coverage levels, buildout scopes and schedules, technology selections, and other provisions. For a landline project, coverage will usually mean a specific minimum number of lines, but might also mandate the provision of service to minimum population clusters within certain geographic areas. These requirements often become more stringent with time. The concession usually requires initial buildout in areas of pent-up demand, thus providing fairly good cash flow from the initial service area, but may require building out to increasingly remote areas, which could increase costs and delay completion. Additionally, terms regarding coverage requirements and engineering concerns, including topography and the availability of antenna siting in urban areas, will also affect capital expenditures. Finally, the project's digital protocol might have operational implications for roaming into the service territory of other operators that may be using analog, different frequencies, or different digital protocols.

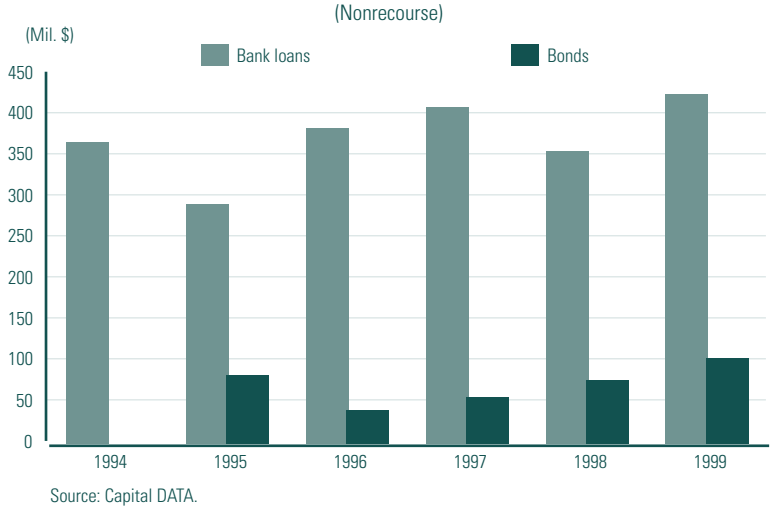
Standard & Poor's also examines the limits to competition included in the concessions. Important considerations include the level and term of service exclusivity granted to the project, and requirements for interconnection to would-be competitors. Real competition may hinge on interconnection terms, which if reasonably priced, may allow a new entrant to offer service before completing its own network by using the incumbent's network to jump-start its operations. Provisions for full service resale and the availability of unbundled network elements are also studied.

Standard & Poor's will examine the regulator's track record with enforcement and interpretation of concession provisions, and will request meetings with the regulator and/or other appropriate authorities.

Chart 4

Average Project Debt Size

(Nonrecourse)



Source: Capital DATA.

Technology and Construction

Technology. The project's choice of technology and its ability to redeploy new technologies are key credit quality factors. Projects can reduce risk profiles by using technology that is commercially proven and that matches the standard for the target market. While some markets have multiple standards—such as the U.S. wireless market—a project's technology approach should ensure that it can capture an adequate share of customers throughout the debt tenor.

Standard & Poor's believes that projects can reduce their technology risk profile file by developing systems that can readily accommodate technology upgrades throughout the debt tenor at minimal cost. While this approach is difficult for, say, a power or oil refinery project due to prohibitively costly capital substitution, many telecom projects can readily be upgraded with new transmission equipment. For example, capacity increases on undersea cable can be achieved by upgrading the laser and switching equipment on either end of the cable—a relatively straightforward task that is far less costly than laying another cable.

Telecom projects must have sufficient cash flow to fund these capital upgrades, which may

be challenging due to the highly competitive and potentially declining price environment. In addition, borrowing to fund capital expenditures may also be unavailable in adverse credit markets. Thus, Standard & Poor's believes projects can reduce their technology risk by establishing at closing an adequate fund or funding commitments to update technology at a future date.

Construction. Project finance transactions rely on the revenue earning potential of a single asset, thus timely, proper, and on-budget construction are critical for project success. Therefore, Standard & Poor's expects a project's construction program to include a well-established set of provisions aimed at materially mitigating construction-related risks by allocating such risks to those parties that can best manage them.

The project's overall construction program must match well with the buildout provisions established in its concession or license agreement. Concession provisions often introduce at least two significant risks. First, many concessions can be revoked if project completion is not achieved by a certain date. Second, permitting agreements may require buildout into hard-to-reach areas, which could increase overall costs.

Generally, experience suggests that more creditworthy projects will allocate the bulk of construction risk to experienced contractors, usually under fixed-price, date-certain engineering, procurement, and construction (EPC) contracts. If adequately structured, these contracts can provide strong assurance to lenders that the project will be completed as forecast. Minimal provisions will include material liquidated damage penalties and bonus incentives for schedule and technical performance, strong completion tests, strict limits on change orders, and payment based on progress made. In addition, contractors should provide warranties of a least one year on work performed—perhaps longer when situations require.

Standard & Poor's acknowledges, however, that reliance on fixed-price turnkey contracts might restrict a project's flexibility to accelerate or delay system buildout. Thus, better projects will incorporate some flexibility within an EPC contract to manage the buildout effort with sufficient flexibility as the market may require.

Standard & Poor's also acknowledges that some projects can benefit from other arrangements, such as reimbursable cost contracts with lesser known contractors, when costs are fairly well defined and the scope of activity is limited. Regardless of the approach, Standard & Poor's will examine each contractor's experience, ability to finance its construction operations, and ability pay potential liquidated damages.

Standard & Poor's will review the project's overall construction budget to ensure that costs are reasonable, compared to other transactions, and will examine the adequacy of the project's overall contingency fund to defray unexpected construction related costs.

Finally, Standard & Poor's will expect the project to have obtained all required permits and rights-of-way prior to financial closure.

Operations and Marketing

Standard & Poor's conducts a comprehensive review of the telecom project's operations and marketing functions to determine if the project has the resources to ensure system reliability and maintain competitiveness through the debt tenor.

Operations. In general, telecom projects must maintain operational efficiency to remain competitive. Measures of efficiency are likely to vary between different types of projects, but would include such items as system reliability, expense per line, operating margins, and employees per line. Whatever the measures appropriate for a particular project, Standard & Poor's would expect to see an improvement in operational efficiency measures over time, given growing competition and uncertain price trends. Efficiency of operations in a protected monopoly environment may be of limited value in addressing credit quality. However, given the trend toward competitive-based regulatory systems via privatization and liberalization, a project's ability to continuously minimize cost and to provide higher value-added services are likely to be the cornerstones for successful debt servicing capability.

Marketing. Standard & Poor's analyzes how the project will maximize revenues throughout the debt tenor while minimizing bad debt, fraud, and churn rates. This analysis includes an examination of the experience of the project's marketing management in delivering the project services and the resources available to them. The analysis will attempt to answer questions such as how the product will be marketed, e.g., by an in-house sales force, agents, or resellers, and how credit will be checked. Inadequate credit qualifications are a major cause of bad debt and associated churn. Is the bad-debt policy aggressive enough to terminate nonpayers within a reasonable time? Standard & Poor's

has seen operators take major write-offs for bad debts within the first year or two of operation due to improper bad-debt policies.

For those projects offering wireless services, a track record is vital to attain medium to high speculative-grade credit profiles. This experience can be gained simply over time or by joining with an experienced partner. Standard & Poor's has given at least one extra notch to a rating where the operator or its partner had operational experience.

Financial Performance

Standard & Poor's will review the project's pro forma financial model, gauge the validity of key assumptions, examine financial robustness under stress scenarios, and possibly perform some liquidity analyses. In these efforts, Standard & Poor's will generally focus on a cash basis, i.e., an assessment of the project's ability to pay debt based on operating cash. In appropriate cases, however, EBITDA measures will be used.

Stress conditions are tailored for each project, but in general might include:

- An increase in operating costs;
- A decline in sale volumes;
- A decline in product prices;
- Loss of market share;
- Operation at less than base case capacity;
- A loss of or reduction in subsidies; and
- A combined downside case.

While Standard & Poor's has established general debt service coverage ratios (DSCR) that many project financings must demonstrate to achieve certain ratings levels, telecom industry trends of uncertain regulatory risk, increasing competition, and uncertain price trends makes such benchmarks harder to establish. Standard & Poor's expects that DSCR forecasts will need to be supplemented with additional analyses to properly gauge a project's potential financial performance. One such analysis is a liquidity study of whether or not the project would be in a position to fund its maximum liquidity requirement during stress periods.

Furthermore, Standard & Poor's will determine whether the project's debt amortization schedule is commensurate with potential project risk presented to lenders over the course of the debt tenor. Given the rapidly changing nature of competition and technology in the telecom field, Standard & Poor's believes that projects can reduce their risk profiles by quickly amortizing debt.

Structural and Legal Criteria

A project's transaction structure is important because it can provide the project with certain limited cash flow protection as well as a short-term safety net when difficulties arise. While legal and structural provisions alone cannot protect against inherent operating and financial performance weakness, an otherwise strong project may be rated lower due to legal and structural vulnerability of the transaction. Most telecom projects have no cash flows until the project is nearing completion and operational whereupon revenues can be earned. Legal and security provisions need to be structured accordingly—limiting flexibility in the development and construction phase and yet providing the project appropriate flexibility over the long term.

The security package provided for lenders should include perfected, first-priority interests in all material project assets, contracts, permits, licenses, and ownership interests. In the U.S. and in many other countries, the inability to perfect a lien on telecom licenses creates a problem when structuring the security provisions. Transactions are viewed more favorably from a credit perspective when a license is closely bound to the investor's security package.

The capitalization of a project may affect its rating. Although the debt is nonrecourse, Standard & Poor's believes that if project owners have a sufficient financial stake in the transaction, they are more likely to work with the trustee and investors in addressing the financial or operations difficulties than are owners who have little to lose if the project fails. Standard & Poor's prefers to see that sponsors remain in control of the transaction for a reasonable period of time, and that subsequent sponsors demonstrate certain minimal credit strengths.

To limit the effects of insolvency of transaction parties on the project, Standard & Poor's generally requires that projects be structured to be bankruptcy-remote from any of the related parties, particularly on projects where Standard & Poor's does not have investment-grade ratings on the sponsors. Bankruptcy remoteness of a transaction offers investors more assurance that the project will continue to focus on its sole business and that that the performance of the project assets will not be compromised by internal or external activities.

A project's financing documents should contain a rather well-accepted set of financial covenants that help to reduce project risks, including limitations on additional debt, liens,

and activities; restrictions on equity distributions; and controls on changes in ownership. Limitations on additional debt are particularly important, because lenders are relying on revenues from a single asset that is likely to be operating in a competitive and potentially declining price environment.

Standard & Poor's believes that a project's credit is generally strengthened by covenants that limit, or even preclude, distributions to sponsors unless both robust historic and projected DSCRs are met, and reserve funds are fully funded. Given the merchant-type risk associated with most telecom deals, Standard & Poor's would generally require that distribution test DSCRs be computed on a 12-months-back and 24-months-forward basis, using forecasts made by independent consultants, and be at least 2 times (x) for low speculative- and investment-grade projects.

Reserve funds can help ensure that temporary difficulties do not inevitably lead to debt service problems. Most important, Standard & Poor's has come to require that a debt reserve of at least six months debt service be fully funded at closing, either in the form of cash or acceptable letter of credit. Transaction risks can also be reduced by establishing a technology replacement reserve at closing that will enable the project to undertake system upgrades in the future. This would limit a project's exposure to poor credit market conditions when the funds are required. Projects should also arrange for adequate working capital facilities, especially in situations where incoming payments are not timely matched with operating expenses. Still, Standard & Poor's is likely to require that working capital balances be closed out at least once annually.

Standard & Poor's will examine the transaction's events of defaults, and assess the rights accorded to lenders when events of default occur. The remedies allowed for in an event of default should include acceleration by the trustee, as well as the ability of the majority of lenders to force acceleration, or to waive certain events of default.

Finally, all projects should be insured for an amount at least equal to the face amount of the senior debt under a policy that provides for timely coverage of cash shortfalls, and by a highly rated insurer. A project's insurance should include, at a minimum, all-risk property and casualty, and one year of business interruption insurance, and should be viewed as adequate by a consultant. In any event, the bond trustee and bank lender should be noted as additional insured.

Cross-Border Issues

Standard & Poor's assesses the projects' exposure to sovereign and foreign currency risks. Sovereign risks include potential activities that the host government may take that could affect the project's ability to operate and service debt. Projects issuing cross-border debt are almost always subject to Standard & Poor's long-term foreign currency credit rating on the sovereign, which reflects a government's considerable power to affect the ability of any project to repay its debt, through such means as exchange controls, changes in the operating and fiscal regime for the sector, and expropriation of assets. Projects can achieve ratings higher than the sovereign in special cases where the product is strategic to the government, domestic demand is low, buyers are limited, and payment is made in hard currency. Most telecom projects lack these features. Projects may use risk insurance from government agencies, such as the Overseas Private Investment Corp. and the U.S Export-Import Bank in the U.S., to mitigate some of these risks. But as currently structured, these policies are not likely to provide support for a rating elevation because the payments are usually not dispersed in a timely manner.

Standard & Poor's will also determine the project's likely exposure to foreign exchange rate movements, often using stress scenarios with a material devaluation or depreciation of the currency. More creditworthy projects will be able to mitigate exchange rate exposure with make-whole provisions within concession agreements.

Outlook for Telecom Project Finance

Many of the telecom transactions that Standard & Poor's has rated are generally start-up companies that employ nonrecourse debt, have highly uncertain cash flow, and have high debt burdens. While many of these transactions are considered projects by their sponsors, they lack the strong structural features found in traditional project transactions, including stiff limitations on activities, mergers, additional debt, and distributions to equity, not to mention bankruptcy remoteness from sponsors. As a result, most of these rated telecom transactions are companies that present highly speculative credit profiles, and may gain initial ratings in the 'B' category.

Over time, as these projects complete buildout, gain market share, and demonstrating sustainable positive earnings, an improvement in the rating is possible.

In order for a project to gain an initial rating in the 'BB' category, it would likely have to demonstrate an ability to establish a large-scale network quickly with modest debt burdens; operate under a favorable regulatory regime; have the ability to maintain long-term competitiveness; and likely benefit from implied support from a strong, highly creditworthy parent. In addition, the project would require a much stronger structural makeup than is seen for most 'B' rated credit quality transactions, including limits on asset composition, activities, debt, and distributions.

Due to regulatory and technology uncertainty and the growth in competition, coupled with the rising complexity and debt burdens of projects, most telecom projects will be challenged to obtain initial ratings in the investment grade category without financial guarantees from investment-grade-rated parents, solid structural features, and robust cash flow projections.

Given industry trends toward greater risk and increased lender focus on credit quality, Standard & Poor's believes that some sponsors will increasing rely on traditional single-asset project finance transactions to mitigate transaction risks.

Revised Rating Methodology For Government-Supported Entities

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The economic role of governments in many countries is undergoing considerable transformation. Increasingly, governments are relying on market mechanisms to address the inefficiencies of the public sector. Even where privatization is not currently on the political agenda, policymakers worldwide are showing a growing tendency to expose remaining government-supported entities to market discipline.

In recent years, Standard & Poor's has adjusted its methodology for rating government-supported entities to reflect these trends. Whereas twenty years ago, ratings of such institutions were most often equalized with the ratings of their owner-governments, Standard & Poor's analytical approach has shifted toward an increasing focus on the stand-alone credit quality of the entity, and on determining the durability of the entity's links with the government. This approach is aimed at ensuring that government support is measured consistently and, where there is evidence that support is being reduced, that greater weight is given to stand-alone credit factors when determining the appropriate issuer rating. Abrupt changes in ratings thereby are minimized.

Standard & Poor's is now further refining its analytical approach toward rating government-supported issuers to more rigorously determine the extent to which the rating on such public sector entities is linked—if at all—to that on the government. This revised analytical approach reflects:

- Evidence in a growing number of countries of a reduction in government commitment and support for public sector enterprises. The privatization of enterprises, including entities once thought to be a permanent part of the public sector, is now relatively commonplace. Occasional defaults of public sector enterprises have been allowed to occur, and governments' official statements of support for public sector enterprises have become weaker or less clear-cut.
- The widespread sale of state enterprises, and policy developments such as competition policy in the EU, which not only are encouraging privatization but, equally important, are discouraging the use of government guarantees and other forms of ongoing state support.

Standard & Poor's analysis of the extent of government support for a public sector enterprise, if any, begins by classifying the entity on a continuum that currently encompasses three categories. The first and smallest category consists of public sector entities that Standard & Poor's considers to be most closely integrated into the government and its finances. The second category includes entities that are less closely tied to the government, but have a public policy role in which the government defines their performance and prospects. The last and largest category includes those entities that benefit from supportive government policies and possibly direct assistance, but that, whether currently regarded as such by the government or not, are most capable of functioning independently from it. This classification, in turn, has a bearing on the degree of rating enhancement for issuer ratings based on government support.

Stand-Alone Ratings

Irrespective of the three categories under which the government-supported issuer is classified, the first analytical step is a determination of the entity's stand-alone rating. This is critical as it identifies the downside, or credit cliff, should extraordinary government support not be forthcoming in times of crisis. It provides important information about the asset quality of the owner-government, which may be relevant to the entity's own credit profile.

The stand-alone rating thus reflects the public entity's various strategies, performance, and prospects that are evaluated in accordance with criteria that Standard & Poor's has established for that specific type of entity. The analytical process includes comparisons with the entity's competitors, both locally and internationally.

Also, and particularly where privatization or reduced government involvement is on the agenda, Standard & Poor's makes assumptions as to what changes to the entity's capital structure and business focus are likely to take place on the way to privatization. This results in a stand-alone rating that is forward-looking and necessarily subjective, but that is nonetheless useful in managing the issuer's rating transition up to a possible eventual privatization.

For many government-supported entities, however, the determination of a stand-alone rating is not so clear-cut because of the intricacy of the government's involvement in many aspects of the entity's operations. This can include access to preferential funding, a monopoly position, favorable contracts, and sympathetic regulatory regimes, all of which are difficult-to-isolate forms of support that enhance both operational and financial performance. Conversely, price ceilings, risky investment project mandates, and directives to provide loss-generating goods and services represent forms of government intervention that constrains operational and financial performance. In these cases, assuming a sudden and complete stripping away of all forms of government influence may be neither practical nor informative. As such, the one assumption made in determining the stand-alone rating is that the government will not specifically intervene to maintain the solvency or liquidity of the public entity, or in other words that the government will not bail out the enterprise in a crisis. In short, Standard & Poor's applies the criteria for the type of entity being rated on the basis of that entity's existing business profile and financial position, including whatever government support or intervention the entity typically enjoys in the normal course of business, but excluding credit for any extraordinary government assistance that might be expected in the event of a crisis.

Enhancement for Government Support

Following the determination of the stand-alone rating, consideration is given to government ownership and support.

Three broad categories of government-supported entities. In assessing the credit implications of government ownership or relationship, Standard & Poor's generally classifies government-supported entities in one of three broad categories:

- High integration with the government. This is the smallest and a shrinking category of public-supported entities.
- Policy-based institutions, whose credit standing is linked to that of the government; and
- Other enterprises, where the relationship with the government is supportive and often enhances the entity's underlying credit strengths through helpful policies and the possibility of direct assistance. This category includes the majority of rated and unrated government-supported entities.

The purpose of this categorization is to clarify Standard & Poor's thinking about the relationship between the government and the entity concerned. It recognizes that there are a variety of relationships that imply varying degrees of government help, and varying degrees of certainty regarding government intervention. Standard & Poor's task is to evaluate the appropriate type of government support and factor it into the ratings in a coherent and consistent manner.

The strongest form of government support implies equalization of the ratings between the public enterprise and its owner-government. For policy-based institutions, depending on conclusions about the government's willingness and ability to provide support, the rating would, in general, be within two rating categories of the government's. For other public enterprises benefiting from a "supportive" government, the issuer rating would generally be no more than one rating category above its stand-alone rating.

Defining the Three Categories

In classifying the relationship between the government and the government-supported entity, the guidelines and reasoning outlined below are applied:

High integration. The rating on the public enterprise is generally equated with that on the owner-government when the entity is a government department, ministry, or an agency that is either the source of substantial budgetary revenue, has a constitutionally or legally mandated place in the machinery of government that is difficult to change, or engages in activities that cannot readily be undertaken on a commercial basis. Government support does not result solely from the entity's policy role or importance, but rather from its place in the processes of government. Trends in the treatment of similar entities in other countries that enjoy a similar privileged status are relevant. The debt of these entities may or may not receive explicit guarantees from the government.

Changes in government policy could mean that entities in this category will migrate to other categories over time. Examples of entities currently falling into this category include:

- Most government ministries;
- State oil monopolies (with few exceptions, based in developing countries);
- Deposit insurance agencies; and

- Export credit institutions (with some exceptions in both developed and developing countries).

Public policy-based entities. This category differs from the first in that it encompasses a broader variety of entities for which government support is based on a defined public policy role. Support is both a matter of policy and law, but (in part based on trends in other countries) is more subject to change and so is less robust than for entities in the first category. This support may be expressed, in part, through statutory or ultimate—rather than timely—guarantees (see section below for discussion of guarantees). In general, issuer ratings may differ from government ratings by up to two categories.

Even when government support is assessed as very strong, it is often less than totally certain, and a rating differential between the government and the government-supported entity may be appropriate. Government support is not simply a matter of a positive attitude and supportive disposition. Standard & Poor's must be convinced that the government could and would intervene to avoid default by the enterprise. The degree of likely support for some emerging markets-based public sector entities, in particular, may be limited because of their number and because the government may have a limited financial capacity to support them. Some public sector entities that historically were viewed as critical instruments of government policy may no longer fall into this category because of the changing stance of the government toward them, reflecting a decline in *willingness* to provide support, rather than limited *ability*.

The degree of notching that is appropriate to consider in individual cases will reflect the stand-alone rating of the government-owned entity, the government's rating, and Standard & Poor's assessment of the robustness of government support. Rating distinctions of up to two categories may occur. (When the government's rating is lower, in most cases there will be greater convergence with the government-owned entity's stand-alone rating, by virtue of the stand-alone ratings providing a lower limit). A rating distinction within a single category of that of the sovereign is generally appropriate when the enterprise benefits from a statutory guarantee, the government is rated in the 'AA' or 'AAA' categories, the government's relationship with the entity is regarded as stable, and the number of government-supported entities is relatively small. A larger rating distinction addresses situations where there is no statutory guarantee, there are many government-supported entities with ambiguous or diminishing public policy roles (which, in aggregate, pose a significant contingent financial risk to the government) and situations where the risk of privatization of the rated entity is deemed to be rising.

In particular, Standard & Poor's will consider the following issues:

- The track record of support for government entities.
- The formal policy regarding support and Standard & Poor's evaluation of the policy.
- The mechanisms that are in place for diagnosing and responding to financial distress. Whether the government has financial assets available that can be readily mobilized to assist the entity.
- The financial and political self-interest of the government in keeping the public entity solvent.
- The likelihood of access to the debt markets by the government or its other business entities being compromised in the event of a particular entity defaulting.
- The importance of continued, unimpeded access to debt markets for the government. The stability of policy-making procedures and the administrative and political culture.
- The core public functions, if any, carried out by the public entity.
- The entity's economic and political importance, visibility, and sensitivity; its ranking in terms of order of importance to the government versus other public sector entities; and its public policy role compared with similar entities in other countries.
- The likelihood of private sector entities providing the same products or services on a commercial basis.
- The government's policy and track record regarding privatization. Whether the government assumes liabilities or re-capitalizes companies upon privatization.
- The clear allocation of responsibility for government support and intervention. The definition of responsibilities for government officials, departments, or ministers. The rigor and regularity with which the government monitors the financial position of these entities.

Quite clearly, these issues are not always clear-cut and will be balanced out within the context of the direction of government policy and indeed the underlying credit strength of the enterprise itself in reaching a final rating conclusion. For some emerging market governments,

support may be more questionable where the legal system and governance is weak, and where there are a number of entities relying on such support. In these instances, as well as when privatization prospects are significant, the issuer rating is essentially driven by the inherent credit attributes of the enterprise itself.

A rating committee, notwithstanding the current government policy, might take account of privatization risk over the next three to five years when considering its rating decision. The ultimate rating decision might take into consideration the time horizon of privatization risk, the likelihood of a reversal in current policy, and the stand-alone rating. Within Europe, the impact of EU competition policy on state ownership and support looms large as an issue which might pressure governments to change policy and pursue privatization, or to at least limit government support. The role of EU policy is also an issue in the rating of the German Landesbanks.

Other public entities. The third category includes an array of government-owned enterprises that lack a defined public policy mission. The rating of entities in this third group is generally within one category above the stand-alone rating. The debt of these entities does not benefit from either full-faith-and-credit or ultimate guarantees. In these cases, government credit enhancement reflects two broad sets of circumstances. First, it encompasses situations where government support is possible, but without much certainty. Second, this category encompasses situations where the government does not hold itself out as the ultimate guarantor, but where it acts in a "supportive" manner and as such reduces the business risks faced by the entity.

Specific characteristics of entities in this category include:

Probable support. Government officials have asserted support and pledged to assure avoidance of default. However, Standard & Poor's may have doubts about institutional stability, administrative process, or the ability to diagnose and promptly respond to financial distress, when:

- Government officials have asserted support. However, Standard & Poor's believes an upcoming possible privatization, or an existing partial privatization, contradicts the logic of support or erodes the identity of interest between the government and the enterprise.
- There is a situation of unacceptable ambiguity, where the government has a track record of avoiding default by its enterprises, but its official or stated position is one of nonsupport. Ambiguities of this kind point to an analytical approach that puts very little or no weight on the government relationship, but that essentially focuses on the enterprise's own credit attributes.

Supportive government. The government indicates its support for an entity demonstrated through favorable policies, which may be substantiated by a variety of measures including restrictions on competition, pricing policies, preferential access to credit, favorable business transactions, access to profitable business opportunities, willingness to subscribe equity, or other relevant measures.

The government may provide assistance through favorable industry policies, including taxation breaks or policies, duties on competing imports, provision of infrastructure, or helpful directives to other public sector entities.

Government Guarantees

Some government-supported issuers have outstanding obligations benefiting from a timely, full-faith-and-credit government guarantee. These guaranteed obligations are always rated the same as the government's rating. However, the issuer credit rating will not necessarily be the same, despite the current level of support indicated by the guarantee. To determine an issuer credit rating (and thus the rating assigned to unguaranteed debt), the entity is classified into one of the above-mentioned categories.

Issuer ratings for government-supported entities enjoying a statutory or ultimate, rather than a timely guarantee, are also rated in accordance with the methodology outlined above. As already suggested, these entities are generally placed in the first or second categories of government-supported issuers.

Summary

Broadly categorizing government-supported entities in accordance with the nature and stability of the relationship with the owner-government should enhance the consistency of credit ratings. This approach provides a clear and simple means of tackling the variations in the nature of the relationships between governments and government-supported enterprises, while recognizing the ongoing evolution of these relationships. Relationships between public enterprises and governments are often unclear or seemingly contradictory. Some governments have a clear track record of supporting certain entities even though

the stated policy is one of nonsupport. Some governments treat their enterprises badly, refusing price increases or imposing unprofitable tasks. This sometimes implies acute credit risks, while at other times it reflects and deepens the government's moral obligation to the entity. Governments often deal with public sector enterprises arbitrarily, precisely because they are government-supported and therefore do not need a strong financial profile to continue to trade and access the financial markets. The task of Standard & Poor's is to evaluate the relationship, while recognizing that government support is not a black-and-white issue.

Footnotes. 1. "Government-supported entities" include enterprises in which the government has majority ownership, such as industrial concerns, utilities, financial institutions, and other enterprises producing a product for a fee. In rare cases, the enterprise may have little or no government ownership, but its role as a provider of an important product or as a large employer suggests that it could rely on some degree of government support.

2. The processes outlined here describe the methodology for assigning local currency issuer credit ratings. Regardless of the local currency issuer rating, the foreign currency issuer credit rating of government-supported entities is capped by the sovereign's foreign currency rating. This reflects the high likelihood that obligations of public sector entities will be restructured in a sovereign default scenario.