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WHITE PAPER

CREDIT SUBSIDY COSTS FOR NEW NUCLEAR POWER PROJECTS RECEIVING DEPARTMENT OF ENERGY (DOE) LOAN GUARANTEES: AN ANALYSIS OF DOE'S METHODOLOGY AND MAJOR ASSUMPTIONS

September 2010

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I. Executive Summary: DOE's Methodology and Assumptions Do Not Produce Accurate Estimates of the Credit Subsidy Cost For Nuclear Power Plant Loan Guarantees

Methodology. Credit subsidy costs for the Department of Energy's loan guarantee program are calculated using a standardized methodology and model.[1] Of the major inputs to the model, two of them (default probability and recovery rate in the event of default) have the greatest impact on the model results.

Recovery in the Event of Default: The DOE/OMB analysis employs a recovery rate of 55% across the board for all energy technologies and projects being considered for DOE loan guarantees. The 55% recovery rate was agreed to by DOE and OMB during the administration of George W. Bush. The estimate of recovery rate has no basis in fact or historical data.

Probability of Default: DOE and OMB estimates default probability based on historical data for all corporate debt from the credit rating agencies. For both regulated utility debt and project finance debt, this overstates the probability of default.

Flaws in the Methodology. There are a number of flaws in this approach that inflate the calculation of credit subsidy cost, including:

1. A standard 55% recovery rate is well below the recovery rates observed historically for regulated utility debt and project finance debt.

2. Using the same 55% recovery rate throughout the project life – during construction and after start of commercial operation – is unrealistic. The recovery rate will vary pre-COD (commercial operation date) and post-COD.

3. Historical data demonstrate that default probabilities for both regulated utility debt and project finance debt are significantly lower than default probabilities for all corporate debt.

The Historical Data on Recovery Rates. The 55% recovery rate used by DOE and OMB has no factual basis and is unrealistically low for regulated utilities and for project finance debt.

Regulated Utilities: In an analysis of the historical data on default, recovery and credit loss rates for regulated utilities,[2] Moody's found that the ultimate recovery rates for regulated utility debt were

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[1] The OMB Credit Subsidy Calculator 2 (CSC2) is used by OMB and federal agencies but is not public. It is, however, a relatively straightforward cash flow model that calculates the net present value of payments by the federal government and payments to the federal government, adjusted for probability of default and recoveries in the event of default.

[2] *Default, Recovery, and Credit Loss Rates for Regulated Utilities, 1983-2008*, Moody's Investors Service, May 2009.

98.5% for senior secured bonds in default and 86.71% for senior unsecured bonds.[3] (DOE loan guarantees are, by definition, senior secured debt instruments.) This is significantly higher than the 55% formula used by DOE.

Project Finance: Historical data demonstrate that a 55% recovery rate is unrealistically low. Standard & Poor's Risk Solutions service has evaluated the performance of project finance debt issued by a consortium of banks across a broad spectrum of types of projects over the last 10 years. In its 2009 update,[4] S&P found that "[g]eneral Project Finance recovery levels are relatively high with discounted recovery observations indicating that a very significant percentage of instruments recover between 90% and 100% …. We compared project finance recoveries to those for senior unsecured corporate instruments. The results indicate a more favorable recovery rate for project finance instruments. Project finance loans on average experienced a higher recovery rate than senior unsecured corporate debt, again confirming the sounder credit risk profile of project finance loans."

Only Project-Specific Analysis Can Meet the Requirements of FCRA. For nuclear power projects, the most accurate process for calculating credit subsidy costs is a detailed, project-specific assessment and credit analysis. The current approach, which relies heavily on standard assumptions applied to all technologies, with limited project-specific flexibility, cannot produce accurate results. In fact, the use of a standardized recovery rate does not comport with the requirements of the Federal Credit Reform Act of 1990. FCRA requires the government to consider all of the cash flows over the term of the loan, including fees, defaults, recoveries and contractual and structural protections.[5] For large, customized transactions like those authorized by Title XVII, accurate estimates of recovery can only be derived from detailed project-specific analysis. Recovery values will vary from project to project, depending on the technology, nature and structure of the project, the project sponsors, contractual issues, and many other factors.

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[3] Moody's reports the data as loss given default (LGD), which is one minus the recovery rate.

[4] *Project Finance Consortium Study Reveals Credit Performance Trends from the Early 1990s through 2007*, Standard & Poor's, December 5, 2009.

[5] Section 502(5)(B) of the Federal Credit Reform Act of 1990 provides:

> "The cost of a direct loan shall be the net present value, at the time when the direct loan is disbursed, of the following estimated cash flows:
>
> (i) loan disbursements;
>
> (ii) repayments of principal; and
>
> (iii) payments of interest and other payments by or to the Government over the life of the loan after adjusting for estimated defaults, prepayments, fees, penalties, and other recoveries; including the effects of changes in loan terms resulting from the exercise by the borrower of an option included in the loan contract."

II. Overview of Loan Guarantee Programs in the Federal Budget

The federal government manages a loan guarantee portfolio of approximately $1.1 trillion, consisting of over 65 loan guarantee programs, each with its own unique requirements established in authorizing legislation[6]. The Office of Management and Budget seeks to apply common procedures for budgeting loan guarantee programs through the Federal Credit Reform Act and OMB Circulars A-11 and A-129.

The federal budget totals do not reflect the face value of loan guarantees. Instead the budget records the "budget credit subsidy cost." In simple terms, the subsidy cost is the value of expected cash flows to and from the government over the life of the guaranteed loan. These cash flows reflect payments to the borrower under the loan guarantee, payments by the borrower to the government, adjusted for defaults and recoveries in the event of default. In cases where guaranteed loans are originated by the Federal Financing Bank, the cash flows also would include interest payments by the borrower to the FFB in excess of the underlying interest rate on Treasury borrowing.

Federal agencies generally seek appropriations – i.e., the use of taxpayer funds – to cover the credit subsidy cost for each federal loan guarantee portfolio.[7]

The clean energy loan guarantee program for advanced nuclear energy facilities – authorized by the 2005 Energy Policy Act and administered by the Department of Energy – is unique among federal loan guarantee programs in two respects: (1) the applicants are required to pay the budget subsidy cost (i.e. no appropriation of federal funds is provided); and (2) the budget subsidy cost is set on a project-by-project basis, rather than a programmatic portfolio basis.

The average subsidy cost for all government loan guarantee programs in the 2011 fiscal year is 0.15% of the loan amount. For FY 2008 (the last full fiscal year prior to the current recession), the loss rate on the entire portfolio was 1.33% of the total portfolio assets.

Methodology for Estimating the Budget Credit Subsidy Cost of Loan Guarantees

OMB has developed a standardized methodology and model[8] used by federal agencies to estimate budget subsidy costs. There are four major inputs to the model: (1) probability of default; (2) loss given default (LGD) or recovery in the event of default; (3) the timing of the default (i.e., when in the project's history the default occurs), and (4) the time interval between default and recovery.

Of these four inputs, two of them (default probability and recovery rate in the event of default) have the greatest impact on the model results. These inputs can be established in one of three ways: (1) historical experience, (2) modeling studies, and (3) expert judgment.

Probability of Default: DOE estimates default probability based on historical data from the credit rating agencies. DOE requires the applicant to obtain a credit rating from an independent credit rating agency

[6] The President's FY 2010 budget proposal presents current budget data for FY 2009 for 72 programs. See "Federal Credit Supplement: Budget of the U.S. Government, Fiscal Year 2011," pages 7-11.
[7] Total of guaranteed loan guarantee terminations for default as presented in "Analytical Perspectives: Budget of the U.S. Government, Fiscal Year 2010," page 82.
[8] The OMB Credit Subsidy Calculator 2 (CSC2) is used by OMB and federal agencies but is not public. It is, however, a relatively straightforward cash flow model that calculates the net present value of payments by the federal government and payments to the federal government, adjusted for probability of default and recoveries in the event of default.

and this rating incorporates a probability of default based on historical data. The ratings agencies have compiled historical data on default probabilities for all classes of debt. DOE has assembled this data from all three rating agencies and has produced composite data showing default probabilities for various time periods. This data shows cumulative default probabilities each year for a 20- to 30-year period for all corporate debt. As part of its due diligence, DOE also performs its own assessment using a methodology similar to that employed by the ratings agencies. DOE evaluates a project seeking a loan guarantee in 10 different risk categories and develops a risk rating for each of 9 categories. The DOE methodology allows for an 10th risk category – "other/offsetting factors" – but provides no guidance on how this category is utilized.[9] In practice, however, the composite data from the three rating agencies is the principal input to the model.

Recovery in the Event of Default: The DOE analysis employs a recovery rate of 55% across the board for all energy technologies and projects being considered for DOE loan guarantees. The 55% recovery rate was agreed to by DOE and OMB during the administration of George W. Bush.

Unlike the estimate of default probability, the estimate of recovery rate has no basis in fact or historical data.

Theoretically, the recovery rate may be "notched" – adjusted up or down to some degree – based on project-specific risk analysis. In practice, however, the scoring system used to determine whether or not to allow an adjustment effectively precludes any "notching" and 55% is the recovery rate used. In addition, the 55% recovery rate is applied uniformly across the entire term of the loan, even though recovery rates will differ depending on when a default is assumed to occur. The recovery rate on a loan that is assumed to default before commercial operation, for example, is likely to be different from the recovery rate on a loan that is assumed to default after commercial operation.

In addition, loan guarantees funded through the Federal Financing Bank (FFB) pay an interest rate premium (the so-called FFB spread) in addition to the interest rate for Treasury securities of comparable maturity. In the case of loan guarantees for nuclear power projects, the FFB spread is 3/8 of 1%. Since the FFB spread represents a payment by the project sponsor to the federal government, the entire amount of that spread should be credited against the subsidy cost.

[9] U.S. Department of Energy, Title XVII Loan Guarantee Program, Report to the Committees on Appropriations, Credit Subsidy Methodology, 2009.

III. Lender Protection the Key Determinant In Evaluating Credit Risk And Calculating Subsidy Cost

The principal determinant in calculating credit subsidy cost – and the sole issue of concern to the federal government – is the degree of lender protection and the strength of that lender protection, whether the project applying for the loan guarantee is (1) a regulated project subject to traditional cost-of-service regulation, or (2) a merchant project using a non-recourse project-finance structure. In both cases, detailed analysis and historical data demonstrate that the new nuclear power projects being proposed for DOE loan guarantees provide a high degree of lender protection, although that protection is provided in different ways, depending on whether the project is being developed in a regulated environment or a merchant environment.

Regulated Projects. Two of the leading U.S. nuclear power projects seeking DOE loan guarantees are being developed in regulated states where the companies are subject to traditional cost-of-service regulation. These projects are the Vogtle project in Georgia, being developed by Southern Co., and the Summer project in South Carolina, being developed by South Carolina Electric & Gas Co. Both projects share certain structural characteristics that provide strong protection for the lender (in this case, the Department of Energy):

- Both projects are full-recourse corporate financings. The companies are placing their balance sheets at risk – in essence, pledging the company and its assets as security for the loan guarantee. Since both companies are solidly investment-grade, the DOE loan guarantee is also investment-grade. The calculation of credit subsidy cost must, therefore, reflect the default rates and recovery rates typical of investment-grade regulated utility debt.
- Both projects are in states that provide strong legislative and regulatory support for the projects. Georgia and South Carolina allow the companies to recover their financing costs (interest on debt and a return on equity) as construction proceeds.[10] Both states have passed legislation that provides the companies with a high degree of assurance that investment judged to be prudent will be recovered, even if the project is cancelled during construction.[11]

For projects with these characteristics, given the assurance of investment recovery, the probability of default is extremely small, and the recovery rate in the unlikely event of default is extremely high.

Merchant Projects. Two of the projects seeking DOE loan guarantees are merchant projects that will be built in restructured states and competitive electricity markets. These two projects – the South Texas Project in Texas being developed by NRG and the Calvert Cliffs project in Maryland being developed by UniStar Nuclear Energy – differ significantly from the regulated projects. The merchant nuclear plants are non-recourse project financings – not full-recourse corporate financing – and they do not enjoy the assurance that investment will be recovered through rates.

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[10] Called Construction Work in Progress (CWIP), this ratemaking technique reduces the cost that must be charged to ratepayers when the new plant goes into service. Without CWIP, financing charges are capitalized and charged to customers when the new plant goes into service.

[11] In Georgia, the Georgia Nuclear Energy Financing Act (S.B. 31, enacted in April 2009) allows a utility to recover from its customers the costs of financing associated with the construction of a nuclear plant that has been certified by the Georgia Public Service Commission. The Integrated Resource Planning Act (enacted in 1991) allows a utility to recover its investment, even if the project is cancelled. In South Carolina, the Base Load Review Act (enacted in May 2007) allows the South Carolina Public Service Commission (PSC) to grant a project development order for nuclear projects and a base load review order for any baseload facility, including nuclear projects. A project development order, applicable only to nuclear plants, allows pre-construction and development costs and an allowance for funds used during construction (AFUDC) associated with those costs to be included in the rate increase when the plant goes into service. If the project is abandoned prudently before completion, these costs will be recovered.

Nonetheless, the merchant projects achieve a high level of lender protection. This lender protection is achieved through the financing structure (see "Reasons Why Project Finance Loans Outperform Corporate Finance Loans," page 15). In the case of merchant projects, the project structure typically includes a number of features specifically designed to ensure lender protection, including:

Merchant projects achieve a high level of lender protection. This lender protection is achieved through the financing structure. The project structure includes a number of features specifically designed to ensure lender protection.

- Debt service reserve accounts and operations and maintenance (O&M) accounts, designed to cover operating costs during a period of extended shutdown or subpar operation post-COD.
- Covenants that preclude payments to project sponsors and sweep cash to debt service when debt service coverage ratios (DSCR) fall below certain levels.
- Mandatory prepayment provisions that accelerate debt service when coverage ratios remain below certain levels for a certain period of time.
- Provisions for liquidated damages from the EPC (engineering-procurement-construction) contractor if that company fails to meet performance and schedule expectations. (Similar provisions for liquidated damages can be expected in the EPC contract for any new nuclear power facility.)
- Contingent commitments of equity or additional debt to cover cost overruns, market price risk and to buy down the guaranteed debt, if necessary to maintain Base Case DSCR projections.

In the credit assessment for one such merchant project, the rating agency concluded that:

- the project debt paid off either on time or early;
- default prior to completion was unlikely (given provisions for escalation, contingencies, and supplemental debt and equity financing);
- the project would not default after commercial operation even in the stress cases, which included an extended outage or serious mechanical difficulties combined with a sustained period of low gas prices and absence of CO_2 regulations and related revenues.
- the project did not draw from its debt service reserve fund, and the reserve fund was fully available during years of low debt service coverage ratios, even in the stress cases.

In addition, recovery rates ranged from 80-96% in the first four years of operation, and were significantly higher than 100% thereafter: 95-118% in the second four years of operation; 129-179% in the third four-year operating cycle.

In terms of lender protection, therefore, the merchant projects demonstrate many of the attributes of investment-grade debt. This fact must be incorporated into the analysis of credit subsidy cost.

IV. Recovery Rates: DOE's 55% Formula is Unrealistically Low, Has No Factual Basis, and Inflates the Calculation of Credit Subsidy Cost

The across-the-board recovery rate of 55% used by the Department of Energy and the Office of Management and Budget is a midpoint, chosen arbitrarily, in a wide range of recovery scenarios, including liquidation and complete scrapping of the facility.

A 55% recovery rate is not applicable to a nuclear power project. Once completed, a nuclear power plant is a 60-year asset. Breaking up a nuclear plant that is near completion or ready for commercial operation is not a credible scenario.

In addition, there is no factual basis for the 55% recovery rate. Recovery rates for regulated utility debt and project finance debt are both significantly higher.

Regulated Utility Debt. In its assessment of default, recovery and credit loss rates for regulated utilities,[12] Moody's found that the ultimate recovery rates for regulated utility debt were 98.5% for senior secured bonds in default and 86.71% for senior unsecured bonds.[13] (DOE loan guarantees are, by definition, senior secured debt instruments.) This is significantly higher than the 55% formula used by DOE, and significantly higher than the recovery rates for all corporate debt. (Moody's analysis found recovery rates of 63.17% for senior secured corporate debt, and 36.06% for unsecured corporate debt.)

For both regulated utility debt and project finance debt, the 55% recovery rate used by DOE to calculate credit subsidy cost is inappropriate and unrealistic. For either class of debt, recoveries in the event of default are significantly higher. Historical data and experience confirm this.

In the U.S. over the past 25 years, "only six investor-owned regulated electric utilities have experienced bond defaults. These defaults resulted in recovery for secured debt that was well above the average for defaulting corporate debt, with holders of secured debt eventually recovering 100% of principal and interest on a nominal basis in all six cases."[14]

Project Finance Debt. Similarly, for project finance debt, historical data demonstrate that a 55% recovery rate is unrealistically low.

Standard & Poor's Risk Solutions service has evaluated the performance of project finance debt issued by a consortium of banks across a broad spectrum of types of projects over the last 10 years, and has updated its reports periodically.[15] In its 2009 update,[16] S&P found that "[g]eneral Project Finance recovery levels are relatively high (compared with some other asset classes) with discounted recovery observations indicating that a very significant percentage of instruments recover between 90% and 100% …. We compared project finance recoveries to those for senior unsecured corporate instruments. The results indicate a more favorable recovery rate for project finance instruments. Project finance loans on average

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[12] *Default, Recovery, and Credit Loss Rates for Regulated Utilities, 1983-2008*, Moody's Investors Service, May 2009.
[13] Moody's reports the data as loss given default (LGD), which is one minus the recovery rate.
[14] *Proposed Wider Notching Between Certain Senior Secured Debt Ratings and Senior Unsecured Debt Ratings for Investment-Grade Regulated Utilities*, Special Comment, Moody's Investors Service, May 2009.
[15] See discussion of Basel II proposal in next section.
[16] *Project Finance Consortium Study Reveals Credit Performance Trends from the Early 1990s through 2007*, Standard & Poor's, December 5, 2009.

experienced a higher recovery rate than senior unsecured corporate debt, again confirming the sounder credit risk profile of project finance loans."

Moody's reaches the same conclusion[17]: "Recovery in the event of default is an essential component in determining the magnitude of credit losses …. The average recovery was $82.25 for all Project Finance defaults on senior secured debt. For Project Finance debts that defaulted in 2008, the recovery rates rose to just over $100, much higher than the average recovery rate of $58 for corporate senior secured bonds."

Finally, recovery amounts tend to be higher for long-lived assets that operate well beyond the scheduled maturity of the term debt facilities. Nuclear projects are designed to operate for 60 years, with an original license issued for 40 years. This provides 15-35 years of additional cash flow "in reserve" to cover any shortfalls remaining beyond the scheduled life of the loan.

The Fallacy of Using the Same Recovery Rate
Pre-COD (Commercial Operation Date) and Post-COD

Not only does DOE use an unrealistically low recovery rate in its credit subsidy model, thereby inflating the credit subsidy cost, it uses the same recovery rate throughout the project's life – construction and operation – which further inflates the subsidy cost.

Pre-COD Recovery. Under the rules governing the loan guarantee program, DOE requires a project sponsor to obtain a credit assessment from an independent rating agency as part of its detailed Part II application. In their credit assessments of nuclear power projects seeking loan guarantees, neither Fitch Ratings nor Standard & Poor's were able to define a credible "event of default" before commercial operation.[18] (If there is no default, then recovery rate is an irrelevant concept, of course.) The most likely problem pre-COD would be schedule delay leading to cost increases. In that situation, the rating agencies believe that project sponsors will find the capital necessary to complete the project – in the form of additional equity, or additional subordinated, high-yield debt, or a combination of the two.

In practice, all the nuclear power projects have incorporated substantial contingencies into their cost estimates and financing plans, thereby providing protection against such cost increases. In the case of one merchant nuclear project, for example, contingency amounts built into the base budget are 15-20% of the base project cost. In addition, the project has contingent equity financing available to cover project cost increases. Taken together, the contingency amounts would allow the project to absorb a 35% increase over the base budget.

The protections and safeguards against non-completion built into the nuclear power projects' structures suggest that pre-COD default probabilities are extremely low and that recovery rates, in the unlikely event of default, are high.

At a minimum, the issues of default and recovery rate pre-COD are significantly more complex and nuanced than DOE assumes when (largely for modeling convenience) it uses a 55% recovery rate.

Recovery During Commercial Operation. The new nuclear power plants under consideration for DOE loan guarantees are evolutionary improvements on the 104 light water reactors now operating in the United States. They are either operating outside the United States, or they are under construction and will have operating experience before the U.S. plants reach commercial operation. The technology and operational risk is, therefore, minimal.

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[17] *Default and Recovery Rates for Project Finance Debts, 1992-2008*, Moody's Investors Service, November 2009.
[18] Private communications with Standard & Poor's, Fitch Ratings.

In the unlikely event of a default post-COD, the most likely scenario would be a financial workout in which project finances are reorganized, the equity investment (and perhaps a portion of the debt financing) is written off, and the project continues to operate under new ownership.

Post-COD recovery rates do not remain constant. In fact, they tend to increase over time. In one independent assessment, recovery rates ranged from 80-96% in the first four years of operation, and were significantly higher than 100% thereafter: 95-118% in the second four years of operation; 129-179% in the third four-year operating cycle.

Finally, post-COD recovery rates do not remain constant. In fact, they tend to increase over time, for several reasons:

- Project completion: The value of the assets and contractual obligations pledged to the lenders increase substantially upon project completion, as the project enters commercial operation and begins generating revenues. This fact is not being recognized in the DOE-OMB evaluations where post-COD recoveries remain low and equal to pre-COD recoveries.
- Cash available for debt service: During commercial operation, cash flows available to service the debt tend to escalate in nominal terms over time (as electricity prices increase) while debt service obligations do not. As a result anticipated recoveries from project cash flows tend to increase over time instead of remaining constant.
- Long-lived assets: Recovery amounts increase more significantly for nuclear and other projects that generate revenues well beyond the scheduled maturity of the term debt, as the ratio of future cash flows over outstanding debt amounts increases over time.

The credit assessment of the nuclear projects by the rating agencies confirms that post-COD recovery rates increase over time. In one such assessment, recovery rates ranged from 80-96% in the first four years of operation, and were significantly higher than 100% thereafter: 95-118% in the second four years of operation; 129-179% in the third four-year operating cycle.

Only Project-Specific Analysis Can Meet the Requirements of FCRA

For nuclear power projects, the most accurate process for calculating credit subsidy costs is a detailed, project-specific assessment and credit analysis. The current approach, which relies heavily on standard assumptions applied to all technologies, with limited project-specific flexibility, cannot produce accurate results. In fact, the use of a standardized recovery rate does not comport with the requirements of the Federal Credit Reform Act (FCRA) of 1990. FCRA requires the government to consider all of the cash flows over the term of the loan, including fees, defaults, recoveries and contractual and structural protections.[19] For large, customized transactions like those authorized by Title XVII, accurate estimates of recovery can only be derived from detailed project-specific analysis. Recovery values will vary from

[19] Section 502(5)(B) of the Federal Credit Reform Act of 1990 provides:

"The cost of a direct loan shall be the net present value, at the time when the direct loan is disbursed, of the following estimated cash flows:

(i) loan disbursements;

(iv) repayments of principal; and

(v) payments of interest and other payments by or to the Government over the life of the loan after adjusting for estimated defaults, prepayments, fees, penalties, and other recoveries; including the effects of changes in loan terms resulting from the exercise by the borrower of an option included in the loan contract."

project to project, depending on the technology, nature and structure of the project, the project sponsors, contractual issues, and many other factors.

The vast majority of federal credit programs are characterized by high volumes and relatively low dollar amounts, concentrated in housing, education, rural development and small business. In calculating credit subsidy costs for these program, the Executive Branch makes a number of simplifying assumptions and, because the federal government pays for the credit subsidy costs of these transactions, borrowers are generally indifferent to the methodology by which credit subsidy costs are calculated. In the case of a program involving multi-billion-dollar transactions, and in which the borrower pays the credit subsidy cost, simplifying assumptions are not acceptable.

V. Probability of Default in the Power Sector Is Lower than General Corporate Experience

The electric power industry is generally more stable than other industrial sectors. In 2009, one of the worst years for the U.S. economy in decades, 151 corporate issuers defaulted on $118.6 billion in bonds, a default rate of 13.7%. Last year's defaults exceeded the previous peak of $109.8 billion, set in 2002. Although it was a record year for defaults, not one power company (regulated or merchant) defaulted on a bond offering or loan in 2009.[20]

Even in those situations where electric power companies have filed for bankruptcy protection, the historical data show that bondholders remain whole. According to Moody's Investors Service: "In the U.S. over the past 25 years, only six investor-owned regulated electric utilities have experienced bond defaults. These defaults resulted in recovery for secured debt that was well above the average for defaulting corporate debt, with holders of secured debt eventually recovering 100% of principal and interest on a nominal basis in all six cases."[21] (Most bankruptcies in the electric power sector are what Moody's terms "strategic" bankruptcies, and can often be traced to disputes with regulators over rate relief or other political factors. This was the case for Pacific Gas & Electric Co. and Southern California Edison Co. in 2001, following the California electricity crisis, and for Entergy New Orleans in 2005, following Hurricanes Rita and Katrina.)

Default probabilities for regulated electric utility debt are significantly lower than default probabilities for general corporate debt. For regulated companies, using default probabilities for general corporate debt to calculate credit subsidy costs will produce subsidy costs that are substantially higher than justified.

Regulated Utility Debt. Historical data demonstrate that default probabilities for regulated utilities are generally lower – and often significantly lower – than default probabilities for general corporate debt. This is partly due to the fact that data on corporate debt includes all classes of debt – from senior secured to junior, subordinated and unsecured – and the more junior debt always has a higher probability of default. By contrast, regulated utility debt is generally senior debt.[22] As a result, using default probabilities for corporate debt, as DOE does when calculating credit subsidy cost, will exaggerate the subsidy cost.

In May 2009, Moody's published its first formal study of the historical credit performance of issuers in the regulated utilities industry.[23] The study analyzed regulated utilities worldwide, of which about 72% were based in the U.S. and Canada. The results showed that, since 1983:

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[20] *U.S. High Yield Default and Recovery Rates: 2009 Review and Outlook*, Fitch Ratings, February 4, 2010.

[21] *Proposed Wider Notching Between Certain Senior Secured Debt Ratings and Senior Unsecured Debt Ratings for Investment-Grade Regulated Utilities*, Special Comment, Moody's Investors Service, May 2009, page 5.

[22] Regulated utilities are also more stable than other corporate entities. "Economic-regulated utilities that provide an essential service possess some financing features and analytical considerations that are unique in corporate finance …Because of utilities' often monopoly franchises, regulated tariffs, and the high dependence of consumers on the services, the cash flow and capital structure of a utility typically change only modestly over the course of a business cycle. Furthermore, assets of economic-regulated utilities in highly developed nations have shown less variability in their valuation than the assets of companies in more cyclical sectors." (*Utilities Sector Notching and Recovery Ratings*, Fitch Ratings, March 16, 2009.)

[23] *Default, Recovery, and Credit Loss Rates for Regulated Utilities, 1983-2008*, Moody's Investors Service, May 2009.

- For regulated utilities rated Baa (BBB in the Standard & Poor's and Fitch rating system), the rating category in which most U.S. electric utilities fall, the cumulative default probability at 10 years was 1.87% and at 20 years was 2.16%. By comparison, for non-financial, non-utility corporate debt at the same rating, the 10-year cumulative default probability was 4.88% and, at 20 years, 10.39%.

- For regulated utilities rated Ba (BB in the Standard & Poor's and Fitch rating system), the cumulative default probability at 10 years was 2.78% and at 20 years was 6.38%. For non-financial, non-utility corporate debt at the same rating, the 10-year cumulative default probability was 17.87% and, at 20 years, 22.37%.

Project Finance Debt. Some nuclear projects will be built in an unregulated, merchant environment rather than a regulated environment. Merchant projects will be financed using "project finance" structures. (In a project finance structure, the debt is secured solely by the project with no recourse to the project sponsor's balance sheet.)

Because project finance debt is non-recourse, the conventional wisdom generally holds that project finance debt is more risky than corporate debt. This view is not supported by the historical data, however, as Standard & Poor's analysis starting in 2002 has shown.

Both Standard & Poor's and Moody's find that project finance debt is more robust than commonly believed. Ratings on Project Finance debts have on average been as stable as or more stable than their corporate analogues.

The first systematic assessment of project finance debt relative to corporate debt occurred in the late 1990s, when international banking regulators proposed tighter standards for project finance debt.

The Bank for International Settlements (BIS), headquartered in Basel, Switzerland, helps set international monetary policy for the national central banks. In 1975, the central bank governors of what was then the G-10 formed the Basel Committee on Banking Supervision. As part of its mission, the Committee developed capital adequacy standards for international banks, which served as guidelines for national bank regulators. The Basel Committee published its first report on capital adequacy (Basel I) in 1988. In 1999, the Basel Committee announced plans to revise the capital standards to make them more sensitive to risk (Basel II). Under the Basel II proposal, "specialized lending," which included project finance, was judged to be riskier than corporate lending, which would require banks to increase their capital requirements for project finance loans.

This did not square with the major banks' project finance experience. The banks believed that their portfolios of project finance loans performed better than corporate loans – lower default probabilities and higher recovery rates. In January 2002, four banks – ABN AMRO, Deutsche Bank, Citigroup and Societe Generale which, at the time, originated over 25% of all project loans – commissioned Standard & Poor's Risk Solutions to analyze probability of default and loss given default for project finance loans. The analysis showed that project finance loans "had a lower probability of default (PD) than corporate loans. The 10-year cumulative PD for project loans was 7.63% compared with 9.38% for corporate loans."[24] Recovery rates were also higher for project finance loans than for corporate loans.

The S&P Risk Solutions analysis confirmed what the banks already knew – that the structure of project finance transactions was significantly more robust than commonly believed. In a March 18, 2002, letter

[24] "*Basel II: Assessing the Default and Loss Characteristics of Project Finance Loans,*" Harvard Business School Case Study, January 26, 2004.

to the Basel Committee, the four-bank consortium letter identified 11 reasons why project finance loans were likely to outperform corporate loans (see page 15).

Both Moody's and Standard & Poor's have extensive experience rating and monitoring project finance debt, a category that has grown exponentially since the early 1990s,[25] and both rating agencies continue to find that project finance debt is more robust than commonly believed. "It is in the nature of project financing to have all project collateral pledged as security for the project loan," said Standard & Poor's in a 2005 report.[26] "In effect, project lenders have the entire enterprise as collateral, including everything needed to ensure operations continue as smoothly as possible in case lenders take possession …. That quality in and of itself tends to support strong recoveries because it greatly facilitates a creditor's ability to take over operations with minimal, if any, disruption to revenues. Indeed, a project's financing documentation typically anticipates the potential situation in which lenders take control of a project, thereby eliminating much of the enterprise value destruction that often accompanies a corporate bankruptcy."

Similarly, Moody's notes that "[a]lthough project financing arrangements differ from project to project, some common features are usually present. For example, projects are usually financed with long-term debt (often greater than 20 years) and high leverage (debt/equity ratios often greater than 80:20)." Moody's then affirms the structural strength of project finance debt: "At the same time, however, the senior debt facilities of projects are typically structured to be robust to macroeconomic and performance stresses, and in many cases achieve investment-grade ratings."[27]

Standard & Poor's has found that the "default rates in the Project Finance asset class declined for five consecutive years from 2002 to 2007. In the period 2004-2007, default rates measured well below 1%. The long-term annual default rate falls between 2% and 3%."[28]

According to Moody's Investors Service: "Ratings on Project Finance debts have on average been as stable as or more stable than their corporate analogues …. In the Baa rating category, where the majority of projects are rated, Project Finance debts have had higher default rates than their corporate counterparts across virtually all time horizons. However, the average recovery rate for senior secured bonds was also higher for Project Finance – making overall credit loss rates for Baa Project Finance credits similar to Baa corporate issuers."[29]

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[25] Moody's-rated project finance issuance has grown exponentially, from three debt instruments at the beginning of 1992 to almost 600 by January 2009. The growth has also been large in terms of original face value, with Moody's rating only approximately $1 billion in Project Finance debt in 1992 compared to $120 billion in January 2009. (*Default and Recovery Rates for Project Finance Debts, 1992-2008*, Moody's Investors Service, November 2009).

[26] *Recovery Ratings for Project Finance Transactions*, Standard & Poor's, April 2005.

[27] *Default and Recovery Rates for Project Finance Debts, 1992-2008*, Moody's Investors Service, November 2009.

[28] *Project Finance Consortium Study Reveals Credit Performance Trends from the Early 1990s through 2007*, Standard & Poor's, December 5, 2009.

[29] *Default and Recovery Rates for Project Finance Debts, 1992-2008*, Moody's Investors Service, November 2009.

Reasons Why Project Finance Loans Outperform Corporate Finance Loans

Reason	Explanation
Control of Collateral	Perfected first priority liens on and pledges of the project's collateral (including shares, assets, and material contracts) preserve exclusive access to repayments from a liquidation of the project or for negotiating purposes with sponsors and other lenders.
Strong Sponsors	Involvement of deep-pocket partners with vested interest in the projects, including central governments, sponsors, contractors, insurers, suppliers, off-takers, etc. These parties often have key stakes in the success of the project.
Covenant Triggers	Step-in rights and covenant triggers that serve as "early warnings" to banks to renegotiate a structure before the borrower's credit quality deteriorates beyond a curable point. While corporate loans also have these features, project finance loans are structured deliberately with tighter covenants to trigger a renegotiation of loan terms before any significant credit deterioration occurs.
Sponsor Interests	Sponsors often act as counterparties in the projects, giving them vested interests in the success of the project. While not contractually obligated to support a project, these groups are frequently willing to inject equity into a troubled project.
Restrictions	Restrictions on facility drawdowns, use of proceeds, and mandatory payments in favor of the lenders.
Sponsor Incentives	Contractual obligations, penalties, and remedies to influence the activities of the sponsors in favor of the lenders.
Cash Flow Protections	Offshore and debt service accounts to mitigate cash flow volatility where appropriate.
Debt Limits	Prohibition on additional indebtedness, which, when combined with the typically steady or increasing cash flows of projects, increases debt service coverages over time.
Transparency	Transparency of a project's performance due to its single-asset nature. In contrast, corporate borrowers frequently have diverse streams of revenues, complicated subsidiary structures and accounting treatments, and cash flow streams that are difficult to analyze.
Project Independence	The essential commercial value of projects allows them to survive the bankruptcy or credit deterioration of a sponsor, supplier, contractor, etc. This ability is due to the inherent independent viability of the project's value and cash flow.
Loan Syndication	The syndication of project financing loans encourages conservative structures that appeal to a broad retail market, limits the possibility of unsophisticated banks being able to offer aggressive bilateral loans, and ensures that all lenders benefit from a controlled recovery process in a default situation irrespective of the size or importance of their respective situations.

Source: "Basel II: Assessing the Default and Loss Characteristics of Project Finance Loans," Harvard Business School Case Study, January 26, 2004.

VI. Conclusion

DOE's methodology for calculating credit subsidy costs, and the assumptions used in the analysis, appear to be either unrealistic or lack a factual basis. This inflates the calculation of credit subsidy cost well beyond the level required to compensate the federal government for the risk taken in providing the loan guarantee.

A number of factors exaggerate the credit subsidy cost, including:

1. The standard 55% recovery rate is well below the recovery rates observed historically for regulated utility debt and project finance debt. Ultimate recovery rates for regulated utility debt range from 87-99%. Recovery rates for project finance debt were comparable: 90-100%.

2. Using the same 55% recovery rate throughout the project life – during construction and after start of commercial operation – is unrealistic. The probability of default pre-COD (commercial operation date) is extremely low, and recovery rates post-COD start at approximately 80% in the early years of operation and increase from there.

3. The cumulative default probabilities for corporate debt, which are used by DOE, are significantly higher than the cumulative default probabilities for regulated utility debt. The electric power industry is generally more stable than other industrial sectors. For example, although 2009 was a record year for defaults, not one power company (regulated or merchant) defaulted on a bond offering or loan in 2009.

4. The default probabilities for project finance debt are no worse than corporate debt (they may, in fact, be lower) and the recoveries in the event of default are much higher than for corporate debt. This class of debt historically displays strong lender protection.

DOE's methodology for calculating credit subsidy costs, and the assumptions used in the analysis, appear to be unrealistic or lack a factual basis. This inflates the calculation of credit subsidy cost.

For nuclear power projects, the most accurate process for calculating credit subsidy costs is a detailed, project-specific assessment and credit analysis. The current approach, which relies heavily on standard assumptions applied to all technologies, with limited project-specific flexibility, cannot produce accurate results. In fact, the use of a standardized recovery rate does not comport with the requirements of the Federal Credit Reform Act of 1990. FCRA requires the government to consider all of the cash flows over the term of the loan, including fees, defaults and recoveries. For large, customized transactions like those authorized by Title XVII, accurate estimates of recovery can only be derived from detailed project-specific analysis. Recovery values will vary from project to project, depending on the technology, nature and structure of the project, the project sponsors, contractual issues, and many other factors.

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