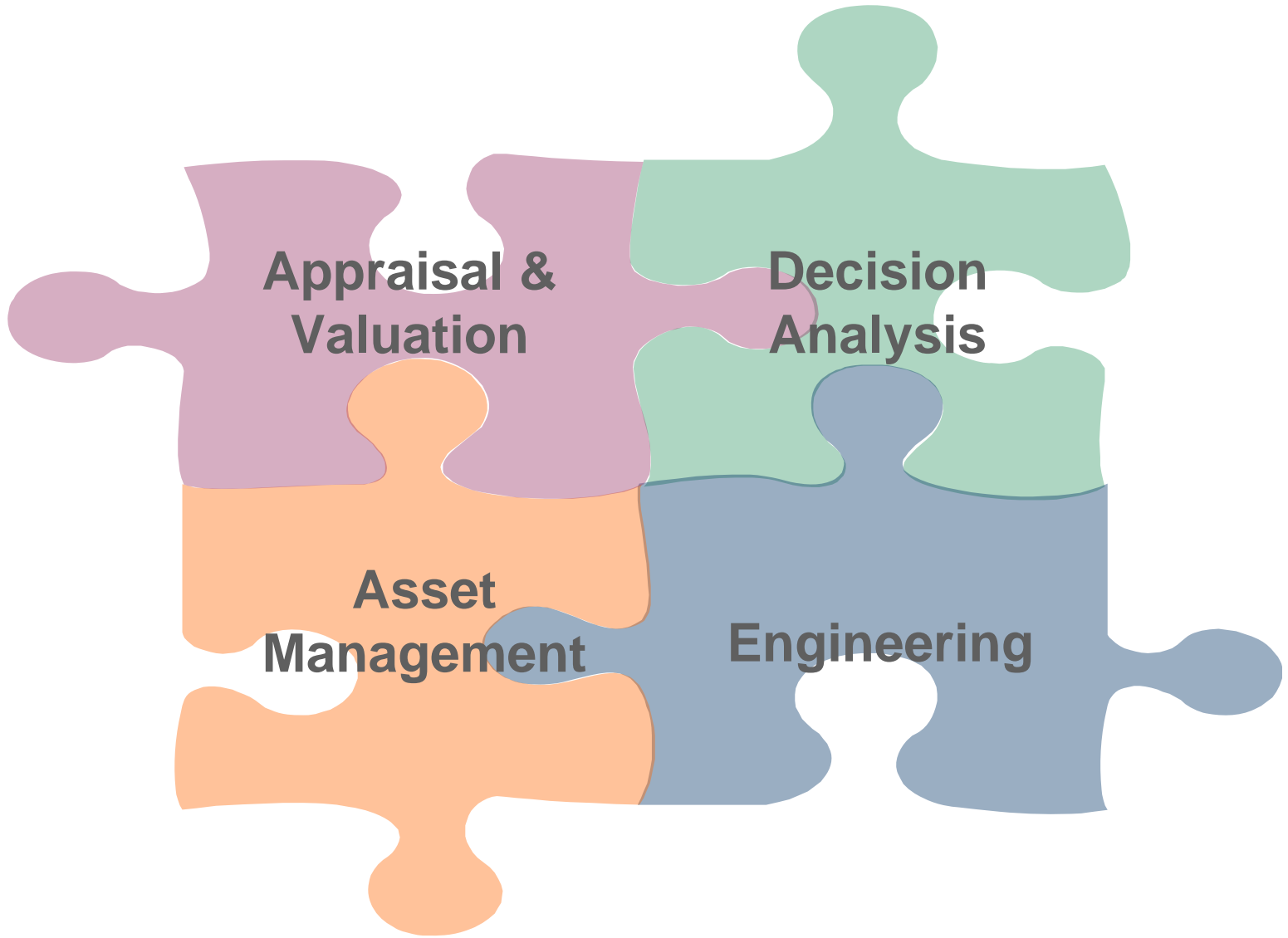


# Competitive Advantage through Simulation-Based Valuation Analysis

**DAI**  
**Management**  
**Consultants**

**Steve Dean, ASA, P.E.**



**Appraisal &  
Valuation**

**Decision  
Analysis**

**Asset  
Management**

**Engineering**

# Recent Transactions

## *Leasing & Project Finance*



**GATX**

**\$30 Million**

Sale of  
Gas Turbine Peaking Plant

**ALGONQUIN  
POWER**

**\$90 Million**

Sale of  
Gas Turbine Combined  
Cycle Plant

**ppl**

**\$325 Million**

Purchase of  
Gas Turbine Peaking Plant

**Mellon**

**\$488 Million**

Sale of  
Coal-fired Steam Plant

**VIACOM**

**\$133 Million**

Sale of  
Gas Turbine Combined  
Cycle Plant

**Prudential Financial**

**\$76 Million**

Sale of  
Gas Turbine Combined  
Cycle Plant

**DaimlerChrysler  
Capital Services**

**\$175 Million**

Sale of  
Gas Turbine Combined  
Cycle Plant

**Ford  
Credit**  
**Ford**

**\$198 Million**

Purchase of  
Gas Turbine Combined  
Cycle Plant

**VIACOM**

**\$150 Million**

Sale of  
Gas Turbine Combined  
Cycle Plant

# Recent Transactions

## Corporate & Investment Banking



**\$561,000,000**

Market advisory services on the acquisition & Term Loan 'B' financing of a gas turbine combined cycle project

*July 2005*



**CAITHNESS ENERGY**

**\$465,000,000**

Market advisory services for a portfolio of geothermal projects, 144A Offering

*July 2005*



**\$165,000,000**

Market advisory services for a portfolio of geothermal projects, 144A Offering

*November 2005*

**LEHMAN BROTHERS**

**CAITHNESS ENERGY**

**\$65,000,000**

Market advisory services for a portfolio of wind projects, Term Loan

*May 2005*



# Uncertainty & Competitive Advantage

- In today's competitive power markets, the biggest determinant of long-term profitability is how participants handle uncertainty
- Uncertainty – *risk* – must be analyzed carefully, critically, and objectively
- Simulation is *the* premiere tool for analyzing risks, and the actual market data now exists to exploit the power of simulation

# Two Types of Simulation

- Simulation of a Process
  - Replication of a dynamic physical system in a computer model (*i.e.*, production model)
  - Valuation of a GTCC plant uses process simulation to replicate the operation of a plant given a *single* particular state of the world
- Monte Carlo Simulation
  - Exposure of a model to potentially *thousands* of future states of the world in accordance with *carefully-selected probabilistic models*
  - Risk analysis of a GTCC facility – *what should we do when we don't know what particular future scenario to expect? How likely is any particular future scenario?*

# Simulation is Proven Technology

- Monte Carlo Simulation has a long and illustrious history
  - Manhattan Project, 1930s-1940s
  - Process Prototyping, 1960s-1970s
  - Option Pricing, Risk Management, VaR, Basel II, 1980s-Today
- A standard, thoroughly-modern, proven, indispensable tool of modern financial analysis

# Promises, Promises

- Lots of models promise “simulation” – but they don't and can't provide the type of simulation needed for robust risk analysis
- **“Our Space”**: DAI has provided Monte Carlo simulation models for utilities, power generation investors, and creditors for more than 15 years

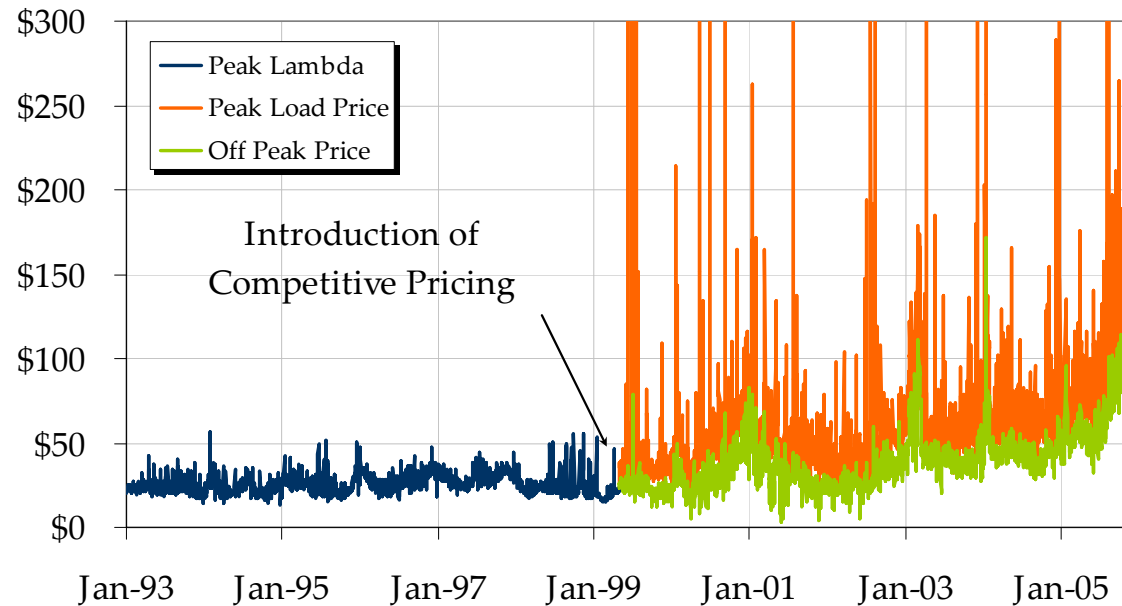


# When are Simulation Models Most Useful?

- Forecasting highly uncertain commodity prices
- Electric generators operating in a deregulated market
- Quantitative Risk Analysis
  - Financial metrics that provide senior management with statistical information to optimize returns for market conditions

# More Uncertainty than Ever...

NEPOOL



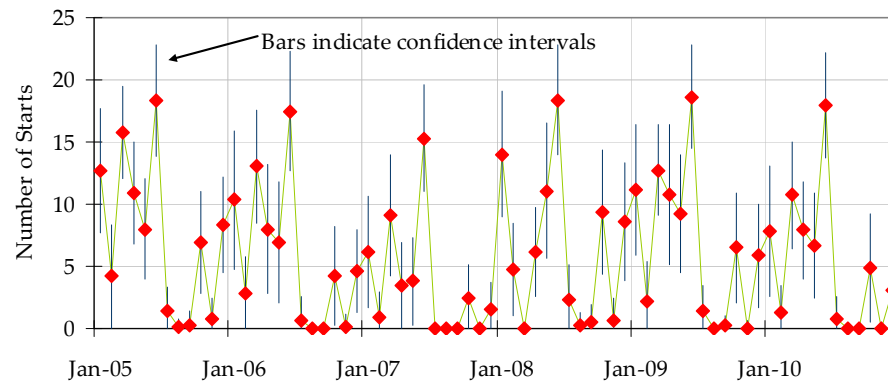
...but does it matter?

# Example #1: The valuation impact of simulation-based risk analysis

- Project in California has 50% toll/50% merchant capacity
- Toll on *some* units impacts operation of *all* units
- Merchant start-up rule complicated by off-taker's operating discretion over tolled units
  - Specified delivery location
  - ISO charges/ancillary services obligations
- Understanding the value of the entire facility required understanding the *dynamic* relationship *between* the different contracted parts – a deterministic or “scenario” analysis would be misleading

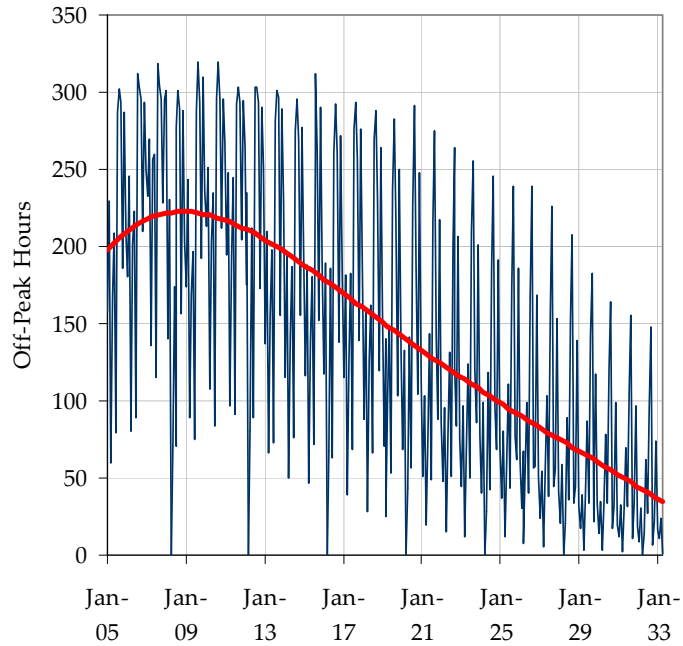
# Key Value Drivers

- Peak vs Off-Peak Performance
  - Peak performance relatively secure; off-peak performance more uncertain – what impact did it have?
- Start-ups vs Operating & Maintenance Costs
- Anticipated and *Conditionally* Anticipated Future Operation
  - Toll units operate under traditional anticipated spark spread rule
  - Merchant units operate under spark spread rule *conditional* on operating costs that depend on whether or not tolled unit is running

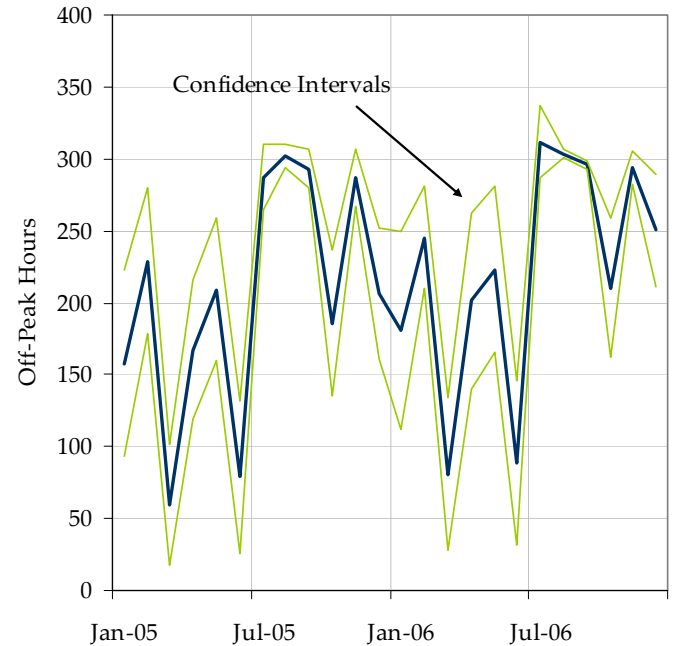


# Process Simulation & Monte Carlo Simulation


**Process Simulation: Modeling a Dynamic System**



**Monte Carlo Simulation: Modeling Uncertainty**



- Simulation analysis was important on two levels:
  - Modeling the complex operating environment of the asset with regard to dispatch decisions and operational/technical constraints
  - Modeling the uncertainty in the key parameters to evaluate the financial risks and opportunities faced by investors/lenders
- Both types of simulation were important and depended on each other

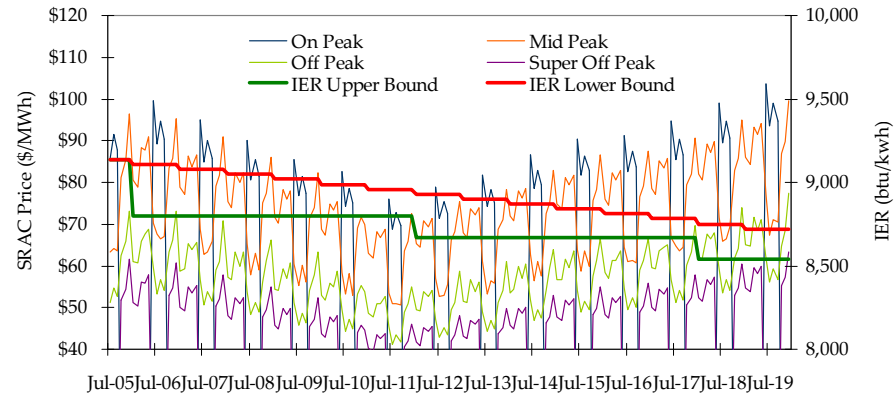
- 
- The flexibility of DAI's model allowed calibration to investor/lender models and facilitated negotiation of ultimate financing package to close transaction
  - Simulation modeling provided a reliable and credible forecast of asset cash flows with statistical information
  - DAI's simulation models are customized to each specific plant and market
  - Simulation models are a better fit to how volatile electric and gas markets actually behave
  - Using simulation to understand the value allowed the investor to maximize the project's value while helping to assure rating agencies that the risks were manageable

# Example #2: Managing Uncertainty When Risks are Ambiguous

- Geothermal projects in eastern California receive SRAC prices under contract with SCE
- With the fixed price period ending, the CPUC is under pressure to modify the SRAC formula
- PURPA/QF status provides contractual certainty...*but* the nature of the contract itself is subject to regulatory uncertainty
- Maximizing project returns requires understanding the boundaries of the contract uncertainties



# How Can I Analyze Non-Explicit Risks?



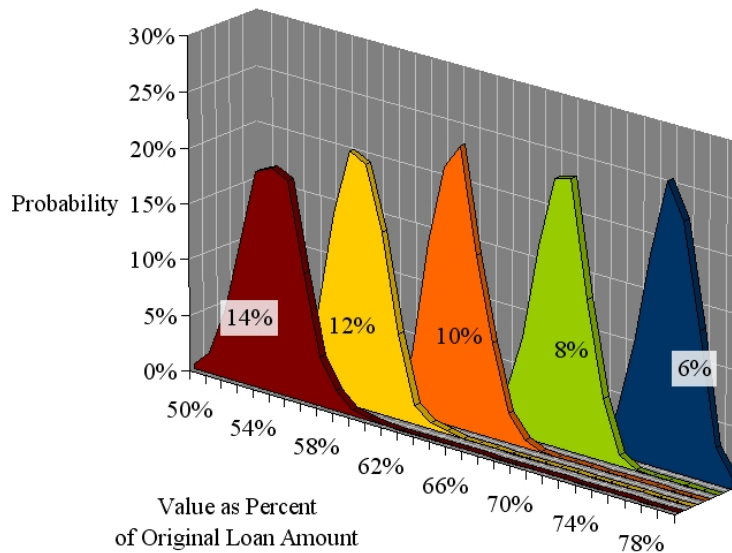
- Statistical analysis illustrated that two key variables dominate the SRAC pricing formula: natural gas prices and the Incremental Energy Rate (IER)
- Changes in each variable produce changes in the SRAC energy price, but simultaneous changes in *both* variables are more likely because of their correlation
- Detailed modeling of the IER, together with simulation of the IER and natural gas prices, produced bounds on likely CPUC action with regard to revision of the SRAC formula

- Analysis made explicit for project stakeholders how diverse regulatory actions would affect project cash flows
- Use of simulation allowed investors to see that the stable “core” of the project’s cash flows was unaffected by potential regulatory changes, enhancing the project’s image as creditworthy and maximizing leverage potential
- DAI’s analytical approach facilitated project participants’ understanding of the various “hidden” components of SRAC pricing, increasing the transparency of the project’s cash flows

# Simulation Examples

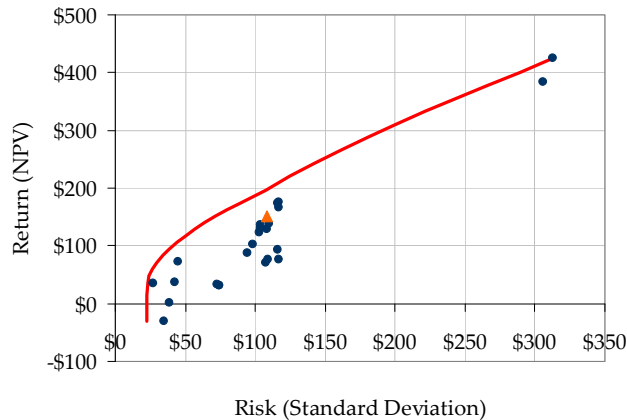
- In both examples, simulation provided:
  - More useful information
  - More accurate information
  - More timely information
- None of this would have been available under traditional modeling approaches:
  - Deterministic cash flow models
  - Best/Base/Worst scenario models
  - “Simplistic” option-pricing models

### Distressed Debt Valuation

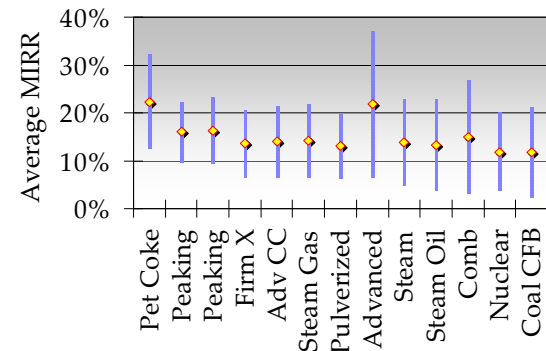
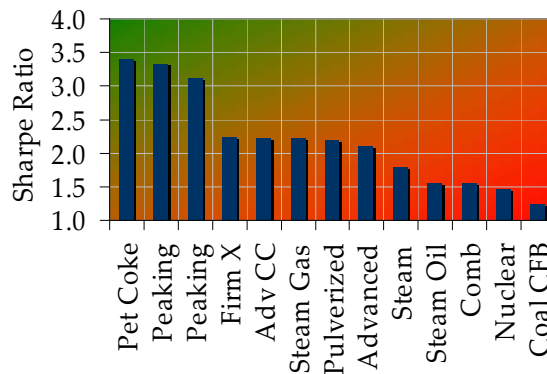


- Valuation of defaulted debt of GTCC plant
- Simulation and real options-based risk analysis of TVA and Entergy markets
- Valuation used for establishing trading range and internal bank capital/risk management

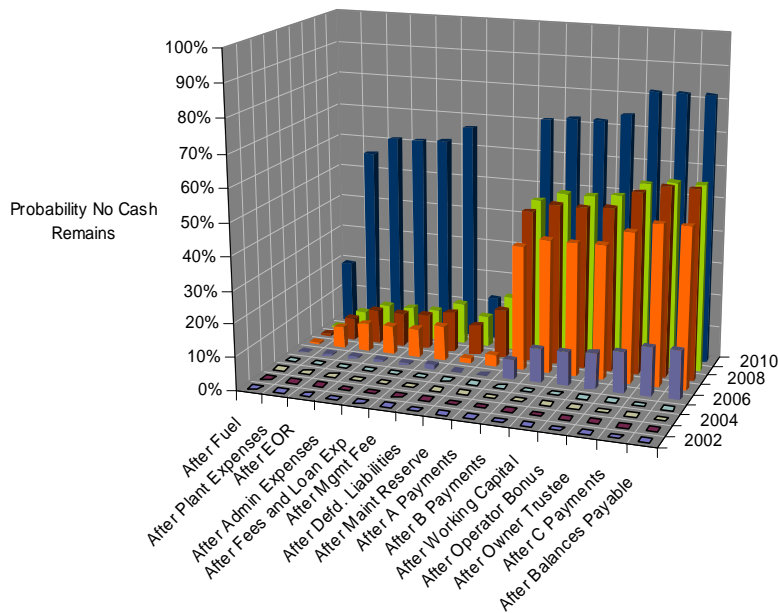
### Portfolio Optimization



- Evaluation of entire generating portfolio of large regulated utility
- Simulation-based risk analysis used to evaluate impact of different regulatory developments
- Results used to guide divestiture decisions and maximize risk-adjusted returns



### GTCC Restructuring



- GTCC facility in default
- DAI assumed operational control
- DAI renegotiated key contracts with lenders and fuel providers
- Increased operating efficiency and cash flows; quickly returned site to profitability

# “What’s in it for me?”

## *Why is Simulation a Superior Methodology?*

- “So simulation-based risk analysis is sophisticated – but does it provide a net benefit?”
- “What do I get with simulation and why should I care?”
- Not simply **more** information, but **better** information
  - More accurate
  - Less subjective
  - More practical and targeted
  - More interactive – a **“tool to think with”**

# Common Questions

- Breaking free from the tyranny of forecasts...
  - How likely is it that next year's revenue will be \_\_\_\_\_?
  - What's the probability that residual values will exceed our booked level?
  - How likely is a default?
    - Given a default, what is our likely recovery?
  - What probability should I attach to best/base/worst case scenarios?
  - How much should I be willing to pay to hedge my risks?
- **Simulation is the *only* methodology capable of quantitatively answering questions about *probability* and *likelihood***
- Bottom Line: Simulation is the premier tool for the Power Industry!!!
  - Would you rather pin your hopes on a single state of the world or would you rather employ a process that can help you succeed *regardless of how events unfold*?



# Common Applications

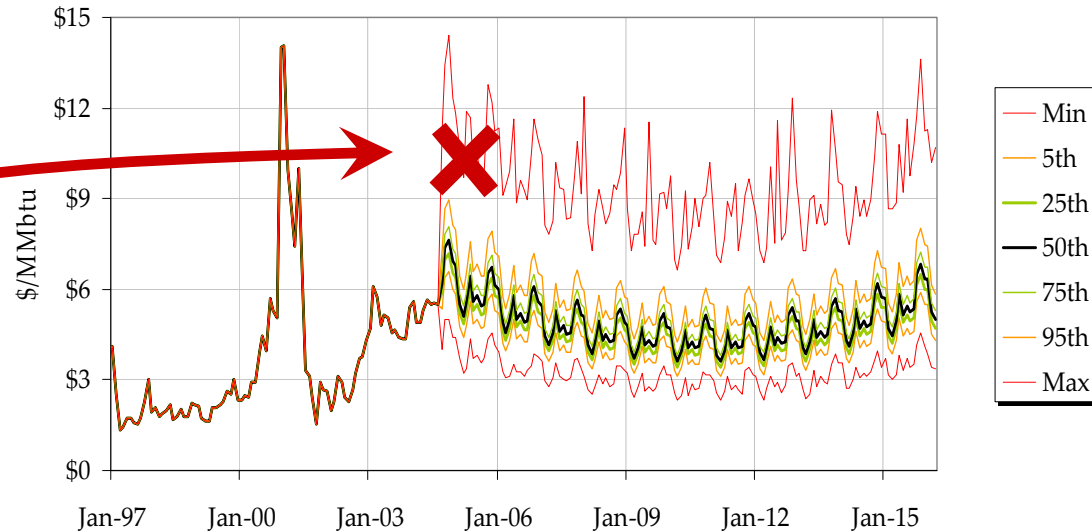
- Debt Service Coverage
  - “The credit committee is concerned about the impact of fuel prices on project DSCR. How can we credibly convince them?”
- Design of debt covenants/project finance
  - “How might changing fuel/power prices affect deal profitability? Can I design a solution to hedge these problems?”
- Buying/Selling equity stakes
  - “What sorts of returns can I credibly expect/offer from/to potential assets?”
- Operational decision-making
  - “What should I expect for maintenance/staffing/revenue/fuel needs from merchant operation? When might it make sense to accept a lower-price contract in exchange for stability?”
- Bidding for assets
  - “We’re not winning any bids!”
- Communication of Project Strengths to Stakeholders
  - Ratings Agencies
  - Equity Participants
  - Syndicate Participants

# Clarity Through Simulation

- A project in California consumes natural gas and produces electricity
- A hedging arrangement is in place, but the credit committee is concerned about the impact of commodity risk on the stability of project cash flows
  - A deterministic cash flow forecast would show a single DSCR, not addressing the committee's concern
  - Scenario (best/base/worst) analysis would show variability, but no probabilistic information
- Only simulation analysis would communicate the probabilistic nature of the risks facing the project *as well as* how different scenarios might unfold

# Apparent Volatility

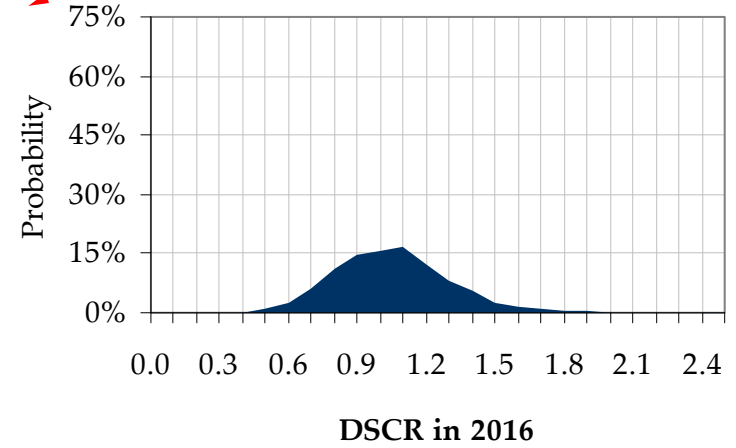
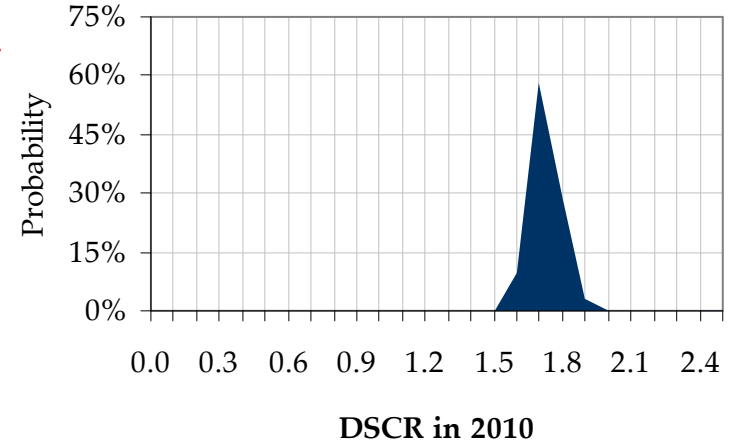
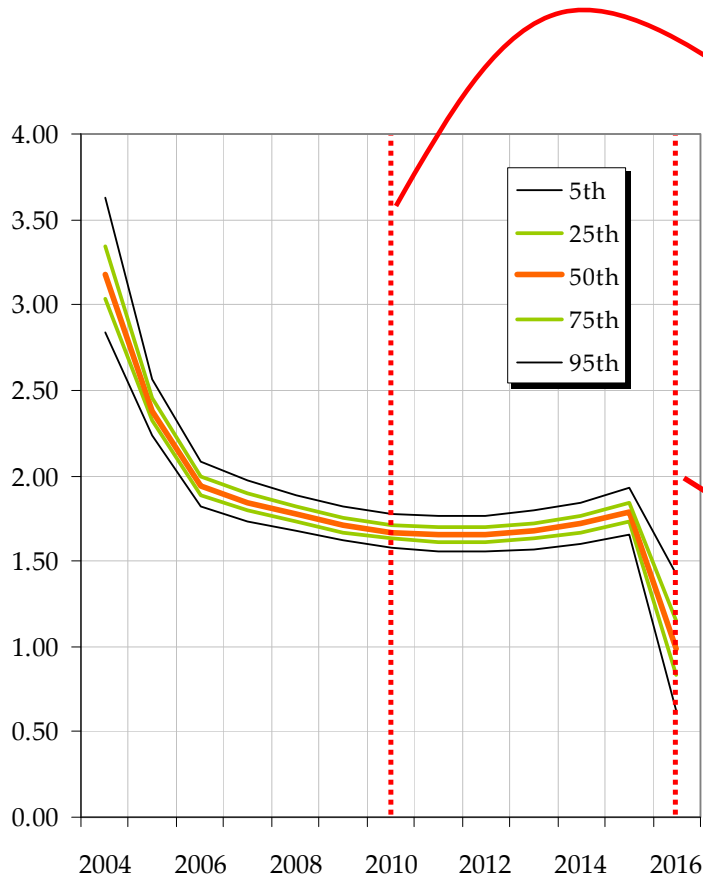
Historical and Projected Malin Prices



It is *tempting* to conclude that DSCR is extremely volatile as well, making the credit risky

**Post-Katrina Note:** *Observe how the spike in natural gas prices post-Katrina – a low-probability event – is nevertheless within the outer confidence band. A deterministic analysis would have been significantly in error*

# Simulated DSCR

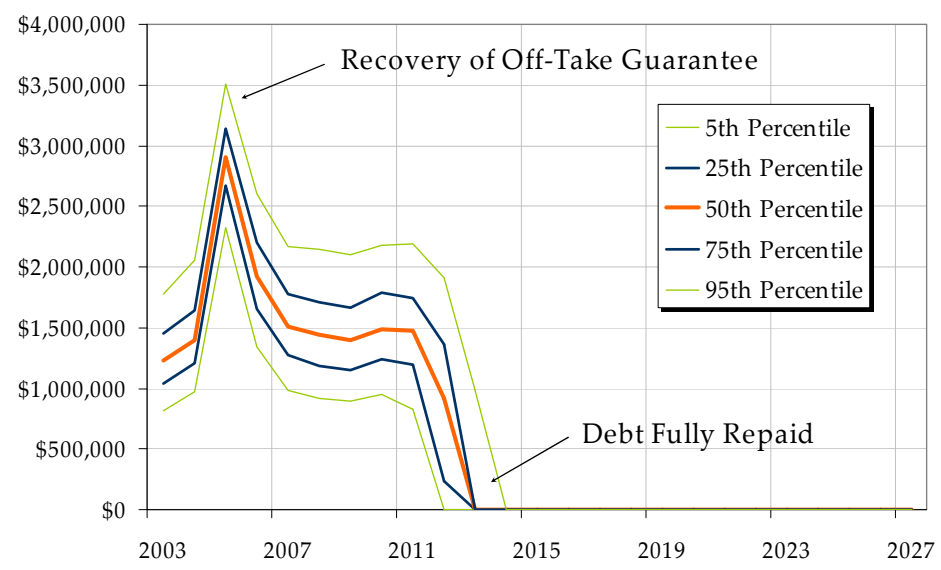


# Diverse Applications

- Capital Structure Optimization
  - Fixing problems before they occur
- Project Debt Valuation
- Portfolio Optimization
- Restructuring Advisory
- Risk Management/Hedging Strategy
- Project Valuation

# Estimating Creditor's Share of Cash Flows

Creditor's Share of Cash Flows

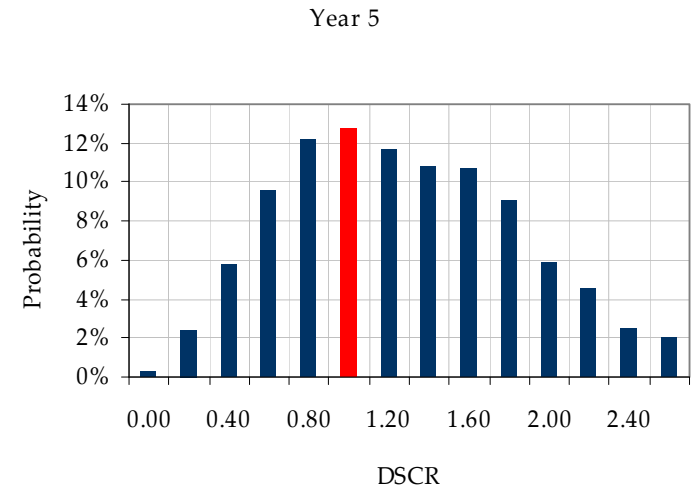
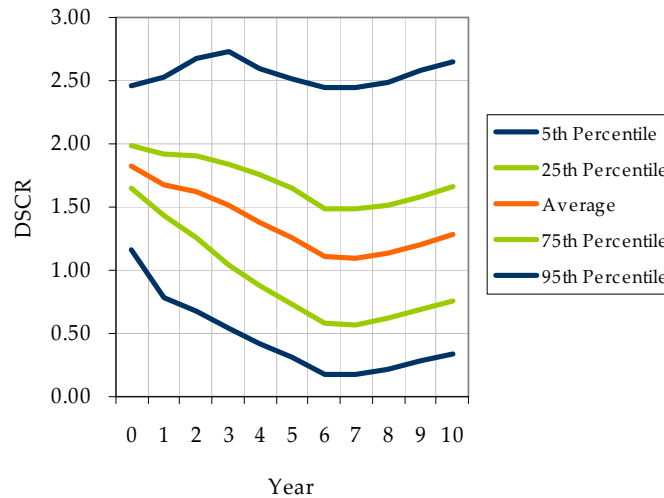


- SERC project defaulted on bank debt
- Bank needed to estimate its recovery cash flows in order to price debt and consider selling its position
- Cash flows to creditor had hybrid debt/equity components and incorporated commodity and operational risks, as well as bankruptcy court recoveries

# How do I use this information?

- Pricing project debt
- Estimating returns to equity
- Restructuring/recapitalization
- Credit risk assessment
- Design of covenants

# Evaluating Alternate Financial Structures

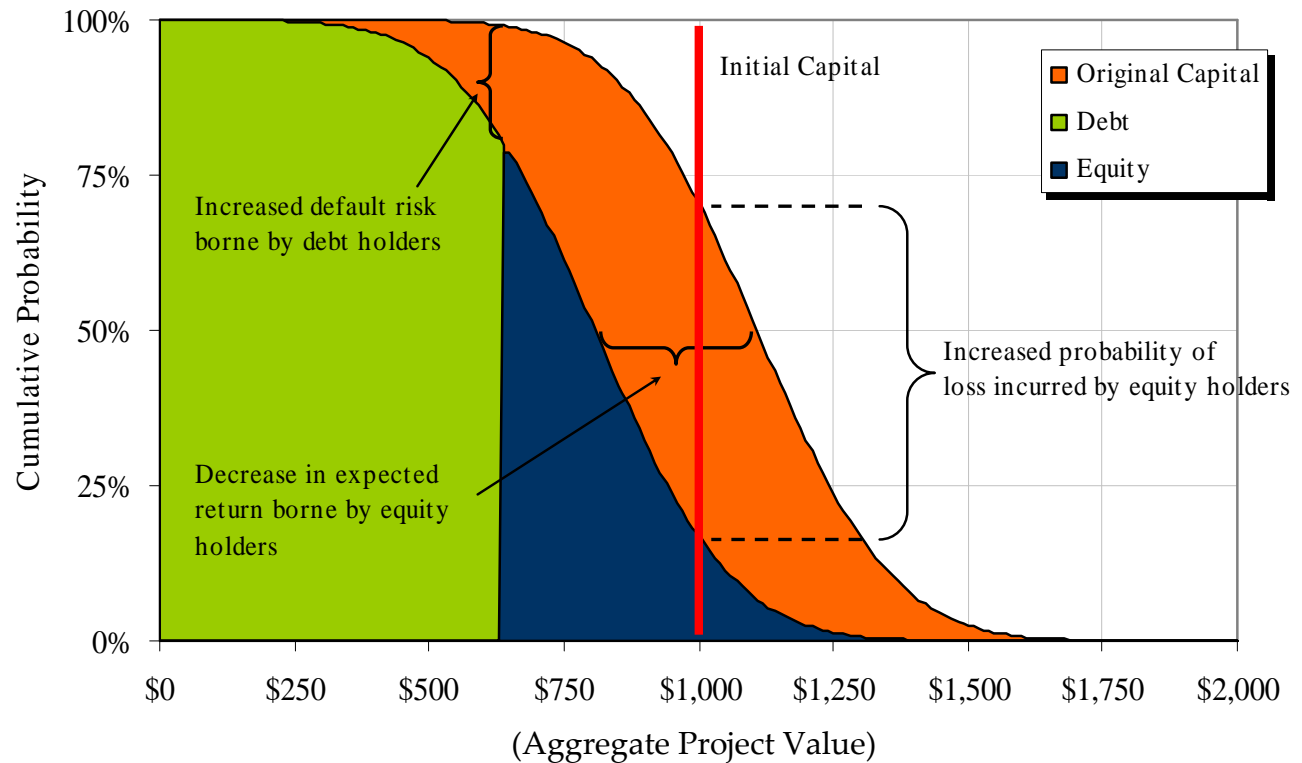


41% of the time Year 5 DSCR is less than 1.0



# How do I use this information?

- Restructure project obligations
- Develop contingency plans
- Evaluate potential investments
- Help secure financing commitments



# How do I use this information?

- Evaluate success likelihood for acquisition strategy
- Illustrate risk impact on each stakeholder
- Help design structures that are robust to uncertainty

# Applications & Benefits

- Application
  - Establishing estimate of the trading range for asset equity and bank debt
- Benefits
  - Facilitates setting capital reserve levels
  - Highlights opportunity costs in buy/sell/hold decisions

# Applications & Benefits

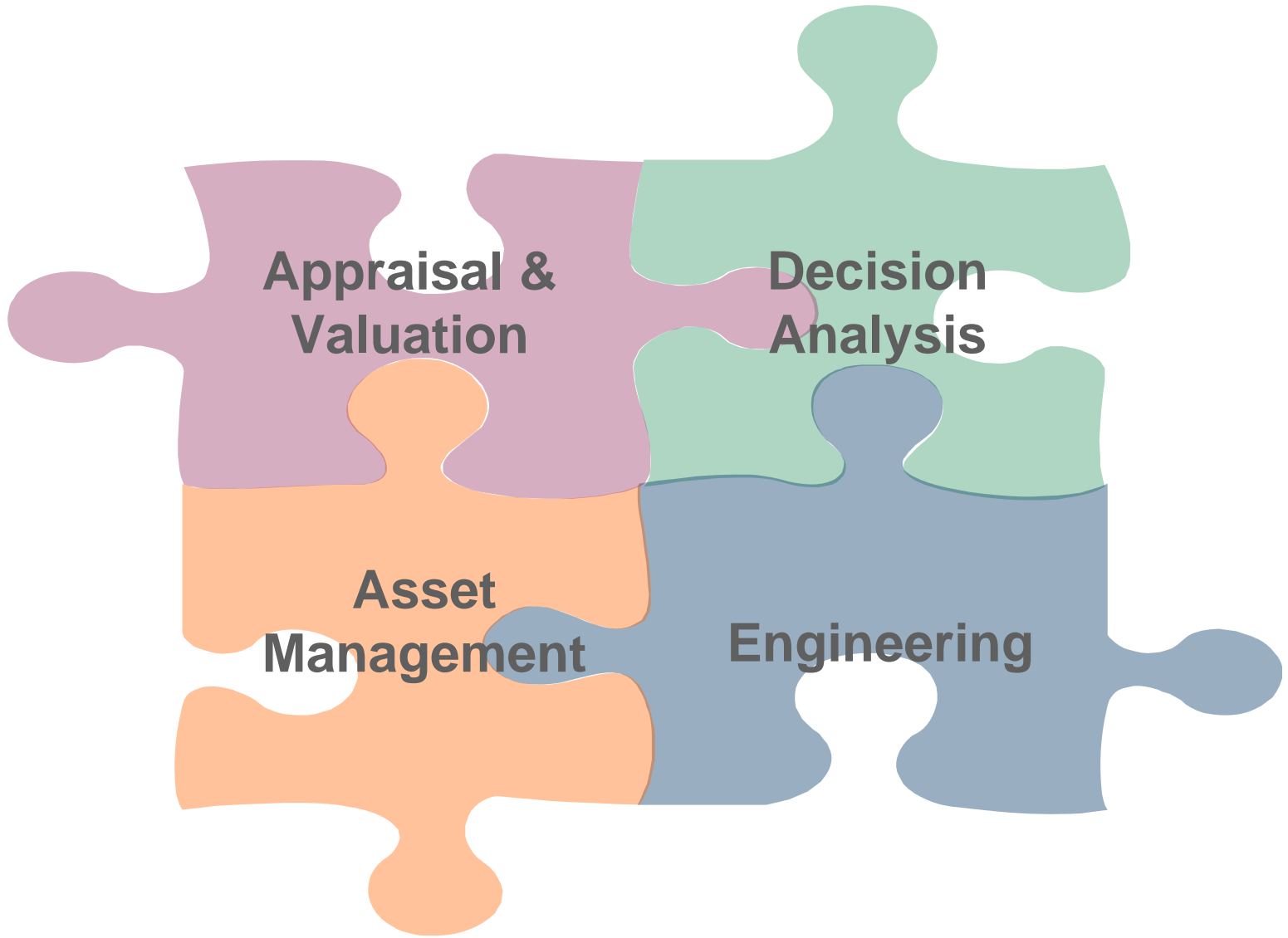
- Application
  - Setting project reserve account levels that both preserve project solvency and maximize cash flow to investors
- Benefits
  - Makes financial consequences of uncertainty explicit to protect lenders
  - Allows tailoring reserve account levels to specific risk preferences
  - Illustrates reserve account response to specific risk factors (“drilling down”)

# Applications & Benefits

- Application
  - Valuing projects with complex cash flow structures (operating discretion, storage options, dual interconnects, *etc.*)
- Benefits
  - Makes extrinsic/intrinsic values explicit
  - Illustrates impact of uncertainty by risk factor (*e.g.*, “how much of the project’s risk comes from \_\_\_\_\_?”)
  - Highlights the potential value of hedging arrangements and integration of non-physical assets

# Who has DAI worked for?

- Money Center Banks
- Regulated Utilities
- Leasing Companies
- Industrial Firms
- Insurance Companies
- Law Firms
- Government Agencies



**Appraisal &  
Valuation**

**Decision  
Analysis**

**Asset  
Management**

**Engineering**



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KIRKLAND & ELLIS LLP

WINSTON & STRAWN LLP

BAKER & MCKENZIE

Exelon<sup>SM</sup>



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