Discounting Future Fuel Costs at a Social Discount Rate

California Energy Commission

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Mike Ringer
Electricity Assessments Office
Electricity Supply Analysis Division
mringer@energy.state.ca.us / 916-654-4168

2007 Integrated Energy Policy Report:

California IOU long-term procurement plans excessively discount future fuel costs, thereby

- understating the impact upon consumers,
- systematically undervaluing non-fuel-intensive alternatives, such as efficiency and renewables, and
- increasing dependence on gas-fired generation.

May 15, 2008 IEPR Update Committee Scoping Order:

Directs staff to identify consequences of using a social discount rate.

Interest Rates

- Used to determine future value of a present sum
- Determined exogenously from returns offered by banks, bonds, commercial paper, etc.

Discount Rates

- Used to determine present value of a future sum (inverse of interest)
- Chosen by the analyst
- Higher discount rates place a greater value on the present compared to the future

Government Agency Views

- Discount rates based on private cost of capital
  - Office of Management & Budget: 7 percent real (marginal pretax rate of return from private sector investment)
  - Energy Commission appliance efficiency regs: 3 percent real (after tax private sector interest rates)
  - Public Utilities Commission D.06-11-018, Economic Assessment of Transmission Projects: use IOU weighted cost of capital

Government Agency Views
(cont.)

- Discount rates based on cost of government funds
  - Lower than the market rate (no risk premium)
  - Consider future generations' interests and not discriminate against them
  - Traditionally for long-lived or public goods projects
  - Remedial measure to counteract market externalities or inefficiencies
- OMB: 3 percent real (pre-tax)
- Energy Commission 2004 IEPR Update: use social discount rate in evaluating transmission investments

Discounting Under Uncertainty - Alternate Views?

Discount rates should not be affected by the uncertain nature of the future cash flows and should be based on the cost of capital, or the return that would otherwise be earned on the funds to be used for the project.

Discount rates should be adjusted for risk to reflect the uncertainty of the cash flows in question, so that based on the market values of those cash flows, high risk returns are discounted more and high risk costs are discounted less.

or Just a Difference in Perspective?

Finance Theory

- Investor's perspective
- Considers the market value of investments
- Applies risk-adjusted discount rate to a single expected cash flow
- Risk premium derived from capital market data

Decision Analysis

- Decision maker's perspective
- Considers wide range of risks
- Applies unadjusted discount rate to uncertain cash flow scenarios

Some Views on Discount Rates

Awerbuch

- Risky fuel expenses are discounted too heavily using the WACC
- They should be discounted at lower rates in accordance with capital market theory

EPRI

- The relevant cost of capital is specific to the project, not the corporation
- Using risk premiums from capital markets is not a rigorous valuation procedure

Some Views on Discount Rates (cont.)

Woo

- Uncertainty drives the portfolio's cost risk
- If uncertainties were internalized via different discount rates, the portfolio would not have a cost variance
- This defeats the purpose of portfolio analysis which is to find an efficient frontier that shows the tradeoff between cost and risk

Stokey and Zeckhauser

- The correct analytical approach is to separate the question of risk-free discount rates from how we value risky outcomes

Some Views on Discount Rates (cont.)

Everett and Schwab

- Risk-adjusted rates will not be a linear function of risk
- For high risk, use other techniques such as certainty equivalents

Pearce and Turner

- Uncertainty does not appear to be related to time in a way that is implied by the use of a single rate in the discount factor

Table 1
Effect of Discount Rates on the Present Value and Levelized Cost of Natural Gas in a Combined-Cycle Power Plant

	Present Value ($/MWh)			Levelized Cost ($/MWh)		
Annual Fuel Price Escalation Rate (%)	**5 % Discount Rate**	**10.65 % Discount Rate**	**Percentage Difference**	**5 % Discount Rate**	**10.65 % Discount Rate**	**Percentage Difference**
1	870	560	55	69.78	68.68	2
2	945	598	58	75.79	73.41	3
3	1,028	641	60	82.51	78.64	5
4	1,122	688	63	90.03	84.43	7
5	1,227	740	66	98.45	90.83	8
6	1,345	798	69	107.89	97.94	10

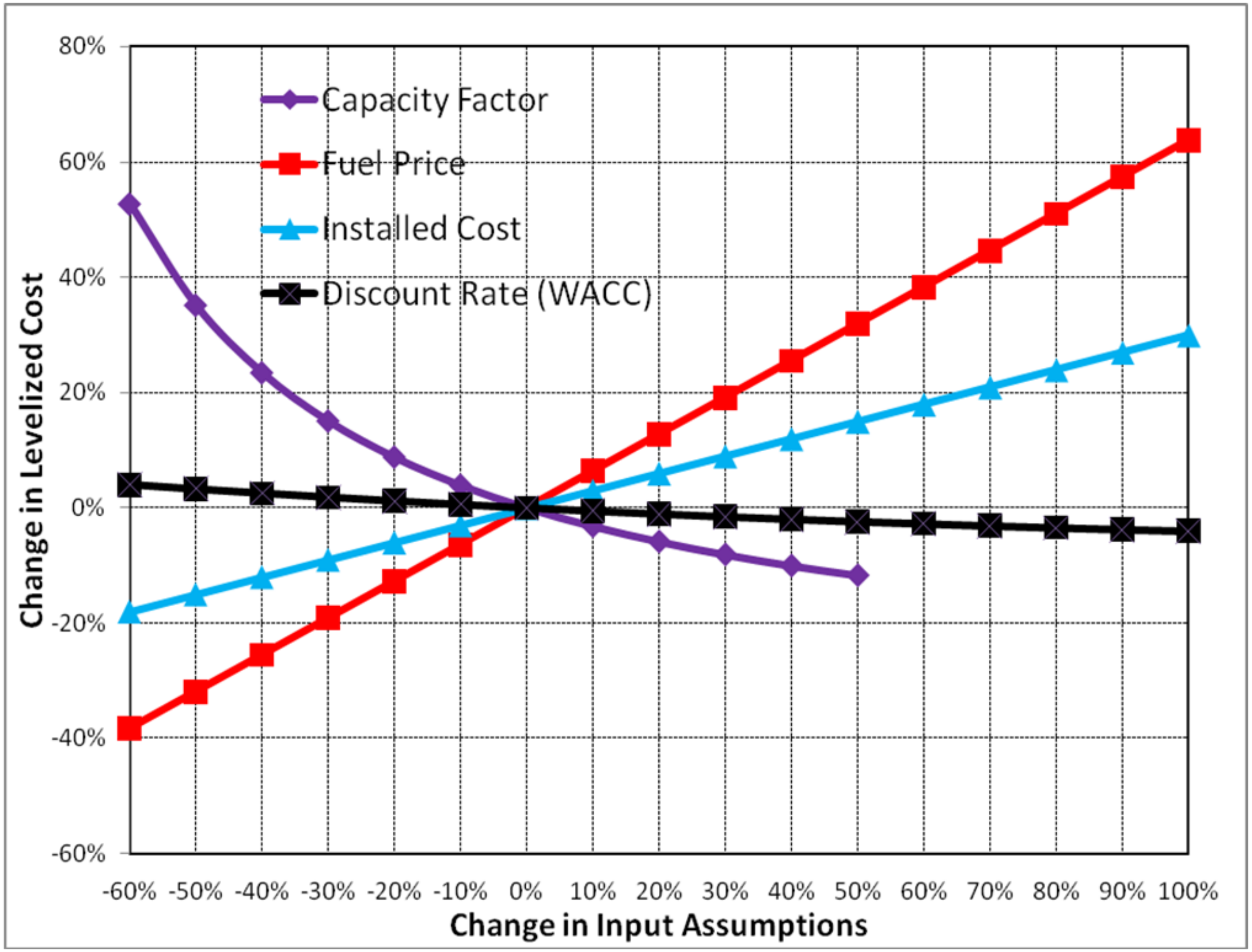
Assumes a 20-year plant life, 2008 startup, 12-year debt term, 20-year federal and state tax life and 40/60 debt/equity ratio

Table 2
Effect of Fuel Discount Rates on Total Present Value and Levelized Costs of a Combined-Cycle Power Plant

	Present Value ($/MWh)				Levelized Cost ($/MWh)			
Annual Fuel Price Escalation Rate (%)	Non Fuel Costs @ 10.65% Discount Rate	Total Costs @ 5% Fuel Discount Rate	Total Costs @ 10.65% Fuel Discount Rate	% Difference	Non Fuel Costs @ 10.65 % Discount Rate	Total Costs @ 5% Fuel Discount Rate	Total Costs @ 10.65% Fuel Discount Rate	% Difference
1	349	1219	909	34	42.87	112.65	111.55	1
2	349	1294	948	37	42.87	118.66	116.29	2
3	349	1378	990	39	42.87	125.38	121.52	3
4	349	1471	1037	42	42.87	132.90	127.30	4
5	349	1576	1090	45	42.87	141.32	133.71	6
6	349	1694	1147	48	42.87	150.77	140.81	7

Assumes a 20-year plant life, 2008 startup, 12-year debt term, 20-year federal and state tax life and 40/60 debt/equity ratio

Figure 1
Effect of Changing Input Assumptions on Combined Cycle Levelized Costs[1]
Start Year 2008 (Nominal 2008 $)



Questions

1. If utilities are required to meet a Renewable Portfolio Standard (RPS), is use of a risk-adjusted discount rate for natural gas cost streams appropriate

- when evaluating portfolio costs?
- if the RPS has been put in place to mitigate fuel cost risk?
- if it has been implemented for reasons other than fuel cost risk?
- if the RPS does not represent a binding constraint (i.e., if least-cost, best-fit procurement yields amounts of renewable energy in excess of the RPS)?

Questions

2. If utility long-term procurement plans are evaluated over a suitably wide range of natural gas prices and associated uncertainties, would using a risk-adjusted discount rate for natural gas cost streams be appropriate when determining portfolio costs?

(This assumes that the purpose of determining the sensitivity of portfolio costs to different fuel prices is to evaluate the tradeoff between expected portfolio costs and risk.)

Questions

3. Should risk-adjusted discounting of fuel costs be used

- when comparing bids received in response to an RFO?
- when accompanied by portfolio analysis as described in Question #2?

If not, are there other adjustments for risk that can or should be used?

Questions

4. If fuel costs should be discounted at a risk-adjusted rate, are there risky costs related to other technologies that should be similarly treated to maintain analytical consistency?

Questions

5. If risk-adjusted discounting is appropriate for present-valuing natural gas costs, should the discount rate be based on a social discount rate or some other measure?

- If based on a social discount rate, how should that rate be derived?