TESTIMONY
OF
ROGER A. MORIN

FAIR RETURN ON COMMON EQUITY
ON
HYDRO-QUEBEC'S ELECTRICITY DISTRIBUTION OPERATIONS

UTILITY RESEARCH INTERNATIONAL

ROGER A MORIN, PhD

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Direct Testimony of Roger A. Morin
On behalf of Hydro-Quebec
Before the Régie de l'Energie du Québec

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PERSONAL INTRODUCTION

My name is Dr. Roger A. Morin. My permanent residence is in Atlanta, Georgia. I am Professor of Finance at the Robinson College of Business, Georgia State University and Professor of Finance for Regulated Industry at the Center for the Study of Regulated Industry at Georgia State University.

I hold a Bachelor of Engineering degree and an MBA in Finance from McGill University, Montreal, Canada. I received my Ph.D. in Finance and Econometrics at the Wharton School of Finance, University of Pennsylvania.

I have taught at University of Montreal's Hautes Etudes Commerciales, McGill University, the Wharton School of Finance at the University of Pennsylvania, Amos Tuck School of Business at Dartmouth College, Drexel University, and Georgia State University. In addition, I have developed and conducted numerous executive development programs for the University of Montreal, Hydro-Québec, Canadian Institute of Marketing, Investment Dealers Association of Canada, Financial Research Foundation of Canada, and Georgia State University. I was a faculty member of Advanced Management Research International, and I am currently a faculty member of The Management Exchange Inc., now known as Exnet, where I conduct frequent national executive-level education seminars throughout the United States and Canada. For more than two decades, I have conducted regular national seminars on "Utility Cost of Capital", "Utility Capital Allocation", and “Alternative Regulatory Frameworks”, which I have developed on behalf of The Management Exchange Inc. in conjunction with Public Utilities Reports Inc.

I have authored several books, monographs, and articles in academic scientific journals on the subject of finance. They have appeared in a variety of journals, including The Journal of Finance, The Journal of Business Administration, International Management Review, and Public Utility Fortnightly. I published a widely-used treatise on regulatory finance, Utilities' Cost of Capital, Public Utilities Reports Inc., Arlington, Va. 1984. My more recent book, Regulatory Finance, a voluminous treatise on the application of finance to regulated utilities, was published in late 1994 by Public Utilities Reports Inc., Arlington, Va..

I served for three years as a consultant in computer applications in finance and investments for the Financial Research Institute of Canada. I was co-founder and director of the Canadian Finance Research Foundation. I have engaged in extensive consulting activities on behalf of numerous corporations and legal firms in matters of financial management and corporate litigation. Exhibit RAM-1 describes my professional credentials in more detail.

I have been a cost of capital witness before numerous federal and provincial/state regulatory boards in both Canada and the U.S., including the Régie de l'Energie du Québec ("Régie"). In Canada at the federal level, I have appeared numerous times before the National Energy Board and the Canadian Radio-Television and Telecommunications Commission ("CRTC"). In the U.S. at the federal level, I have testified numerous times before the Federal Energy Regulatory Commission and the Federal Communications Commission. I have also appeared before some 40 state and provincial commissions, including:

Alabama	Indiana	New Brunswick	Pennsylvania
Alaska	Iowa	New Jersey	Quebec
Alberta	Kentucky	New York	South Carolina
Arizona	Louisiana	Newfoundland	South Dakota
British Columbia	Manitoba	North Carolina	Tennessee
California	Michigan	North Dakota	Texas
Colorado	Minnesota	Ohio	Utah
Florida	Mississippi	Oklahoma	Vermont
Georgia	Missouri	Ontario	Washington
Hawaii	Montana	Oregon	West Virginia
Illinois	Nevada		

I was, and continue to be, involved in several landmark proceedings involving the restructuring of the North American electric utility industry, notably in California, Pennsylvania, Mississippi, and Texas. The details of my participation in regulatory proceedings are provided in Exhibit RAM-1.

I was also a consultant on behalf of regulators as well. I assisted the CRTC for four years in the fields of regulatory finance, applied economics and regulatory policy. I was a consultant for the Ontario Telephone Service Commission (OTSC) to establish procedures for determining the cost of capital for municipal, cooperative, and investor-owned telephone utilities regulated by the OTSC. I have frequently assisted regulatory commissions in matters of regulatory finance and cost of capital methodologies.

BACKGROUND

The North-American energy market continues to experience dramatic change due to growing competition, restructuring efforts, and in some cases, deregulation. Competition is present in numerous segments of the energy markets as regulatory barriers are gradually removed. For example, the interconnection of facilities, the unbundling of facility elements and the equal access to networks facilitate competitive entry. Regulatory public policy increasingly encourages customer choice (wholesale and retail wheeling) by requiring utilities to provide wheeling, open access, and connection services. As a result, the number of new entrants and/or the intensity of competition between existing market participants have increased. New participants in the energy markets include non-utility generators, self-generators, independent power producers, power brokers, and energy service companies, ending the era of the vertically integrated monopoly utility and ushering the era of the unbundled utility.

The restructuring of the U.S. electric utility industry has spilled over in the Canadian markets, although much more slowly. Canadian electric utilities are also under competitive pressure due to industry restructuring. Any economically viable generator of electricity has or will have access to the North American transmission grid, leading to a highly competitive energy market. As the transmission, generation and distribution functions of electric utilities become separated, competition will intensify.

The Canadian electric utility industry is in an excellent competitive posture to withstand the restructuring forces in the industry. While there is growing competition in Canada as well as in the U.S., its development is somewhat mitigated by the surplus of generating capacity in many provinces. The lack of interconnection capacity between regions restricts electricity exports and competition further. Moreover, lower hydro-based electricity production costs and a weak Canadian dollar make electricity very competitive. Competition from natural gas is constrained by its high transportation cost.

In the case of Hydro-Québec, the effects of restructuring are mitigated further by several positive factors, including a lower-cost hydro generating base and lower rates, open access to the northeast U.S. electric grid, and excellent storage capacity. Offsetting the company's favorable competitive position are a lower common equity ratio relative to other electric utilities, vulnerability to fluctuating water levels, marginal profitability, low domestic demand growth, competitive export markets, and limited access to export markets.

In response to the emerging competitive pressures in the industry, Hydro-Québec has functionally separated its major activities of generation, transmission, and distribution into separate administrating units. Hydro-Quebec's electricity distribution operations, which I shall refer to as "HQ Distribution", are now housed in a separate administrative entity. The risk profile of HQ Distribution is discussed fully in Section II.

PURPOSE OF TESTIMONY

I have been asked to: 1) conduct an independent appraisal of the fair and reasonable rate of return on the common equity capital ("ROE") of HQ Distribution in light of current and prospective capital market conditions, 2) recommend a return on such capital which will be fair to the ratepayer, allow the company to attract capital on reasonable terms, and maintain its financial integrity, and 3) to assess the reasonableness of HQ Distribution's requested capital structure.

SUMMARY OF TESTIMONY

I recommend that a rate of return in the range of 10.5% - 11.0% be used for ratemaking purposes for HQ Distribution as the return required to attract capital on reasonable terms, maintain financial integrity, and be commensurate with returns on comparable risk investments. My recommendation is derived from cost of capital studies that I performed using the financial models available to me and from the application of my professional judgment to the results obtained, in light of HQ Distribution's long-term investment risks and economic environment. I applied various cost of capital methodologies to several surrogates for HQ Distribution, including: Canadian gas and electricity distribution utilities, combination gas and electric utilities, and regulated natural gas utilities. I have also surveyed the risk premiums allowed by regulators on comparable risk companies as indicators of the appropriate risk premium for the electricity distribution business. I also recommend that a capital structure made up of 35% - 40% common equity be employed for ratemaking purposes based on deemed and actual capital structures of comparable electricity and gas distribution utilities.

TESTIMONY ORGANIZATION

My testimony is organized in five (5) broad sections:

I. Conceptual Background

II. Risk Environment

III. Cost of Capital Estimates

IV. Capital Structure

V. Summary

The first section discusses the theoretical background underlying the various methodologies used in estimating HQ Distribution's cost of equity capital. HQ Distribution's risk environment is described in the second section. The third section describes the results obtained from the various cost of capital methodologies. In the fourth section, I discuss HQ Distribution's capital structure. In the final section, the results from the various approaches used in determining a fair and reasonable ROE for HQ Distribution are summarized.

I. CONCEPTUAL BACKGROUND

This section of my testimony provides the theoretical background and discusses the methodologies for determining a company's cost of capital and that of its business segments.

I. 1. RISK AND RETURN

The required rate of return on a security is the compensation required by investors for postponing consumption and exposing capital to risk. When investors supply funds to a utility by buying its stocks or bonds, not only are they postponing consumption, giving up the alternative of spending their dollars in some other way, but they are also exposing their funds to risk. Investors are willing to incur this double penalty only if they are adequately compensated. The compensation they require is the price of capital, or rate of return. If there are differences in the risk of the investments, competition among firms for a limited supply of capital will bring different prices. These differences in risk are translated into price differences by the capital markets in much the same way that commodities which differ in characteristics will trade at different prices.

Of course, the required return is not assured. Risk is defined as the variability of outcomes around the expected return. For an undiversified investor who views a security in isolation, the standard deviation of realized returns provides a valid estimate of the security's risk. An underpinning of modern financial theory is that an investor diversifies by combining risky securities into a portfolio such that the risk of the portfolio is less than any of its parts through diversification effects. Diversification reduces portfolio risk because security returns do not move perfectly together. Complete elimination of risk is impossible however since securities all move together to a certain extent because of the influence of pervasive market-wide forces.

According to modern portfolio theory, a security's total risk can be partitioned into "specific risk", the portion unique to the company, and "market risk", the non-diversifiable portion related to the general movement of security markets:

Total Risk = Market Risk + Company-Specific Risk

The core idea of modern finance theory is that investors can eliminate the company-specific risk component by diversifying their portfolios, and should therefore not be rewarded for bearing this superfluous risk. Diversified investors can only eliminate the company-specific component of risk, and cannot eliminate the market risk component, however. Therefore, they are rewarded with higher expected returns for bearing only market-related risk, which is measured by "beta". Beta is the classic measure of market risk, and captures the extent to which a security's returns move in tandem with the returns of the overall market.

Modern financial theory has established that beta is an important determinant of return, and incorporates several economic characteristics of a corporation which are reflected in investors' return requirements.

Risk-averse investors demand higher returns for assuming additional risk, and higher-risk securities are priced to yield higher expected returns than lower-risk securities. The Capital Asset Pricing Model (CAPM) formally quantifies the additional return required for bearing incremental risk, and provides a formal risk-return relationship anchored on the basic idea that only market risk matters, as measured by beta. According to the CAPM, securities are priced such that:

EXPECTED RETURN = RISK-FREE RATE + RISK PREMIUM

$$K = R_F + \beta(R_M - R_F) \quad (1)$$

Equation 1 is the CAPM expression which asserts that an investor expects to earn a return, K, that could be gained on a riskless investment, R_F, plus a risk premium for assuming risk, proportional to the security's market risk, also known as beta, β, and the market price of risk, $(R_M - R_F)$.

It is well established in academic research that the CAPM produces a downward-biased estimate of equity cost for companies with a beta of less than 1.00. This literature is summarized in Chapter 13 of Morin, R. A., Regulatory Finance, Public Utilities Report Inc., Arlington, VA, 1994. Expanded CAPMs have been developed which relax some of the more restrictive assumptions underlying the traditional CAPM responsible for this bias, and thereby enrich its conceptual validity. These expanded CAPMs typically produce a risk-return relationship that is "flatter" than the traditional CAPM's prediction, consistent with the empirical findings of the finance literature. As discussed fully in Appendix C, the following equation, known as the Empirical Capital Asset Pricing Model (ECAPM) provides a viable approximation to the cost of equity capital estimate suggested by these expanded CAPM models and can also be used to determine the cost of capital: The constant term 'a' is determined empirically.

$$K = R_F + a\,(R_M - R_F) + (1 - a)\,\beta\,(R_M - R_F) \quad (2)$$

With an empirically determined constant of 0.25, equation (2) becomes:

$$K = R_F + 0.25\,(R_M - R_F) + 0.75\,\beta\,(R_M - R_F) \quad (2a)$$

I. 2 ROE IN PRACTICE

There are other methodologies that can be applied to measure a fair and reasonable ROE besides the CAPM and the ECAPM:

1. Discounted Cash Flow ("DCF")
2. Risk Premium
3. Comparable Earnings

These approaches are described in succinct form in Appendix A, "*A Review of ROE Methodologies*". While, in theory, all the techniques should be employed, more weight should be accorded to the CAPM and Risk Premium methodologies from a practical perspective, especially in the Canadian context where degrees of freedom are scarce in terms of data availability.

The DCF and Comparable Earnings methodologies are particularly difficult to implement in practice when you are dealing with the fast-changing and fluid circumstances of the Canadian utility industry and the scarcity of reliable capital marke data on comparable companies.

PAUCITY OF CANADIAN DATA

One serious obstacle to implementing cost of capital estimation methodologies is that there is only a handful of publicly-traded investor-owned pure-play Canadian electric utilities with adequate historical data. DBRS's "The Canadian Electricity Industry Study 2001" lists only five investor-owned electric utilities in its industry survey, several of which are very thinly traded on stock exchanges:

UtilitCorp Networks Canada (BC)
ATCO Electric
TransAlta Utilities
Northern Ontario Power
Nova Scotia Power (now Emera)

UtilitCorp Networks Canada (BC) is a wholly owned subsidiary of UtilityCorp United Inc., a large diversified U.S. energy company. Nova Scotia

Power is a wholly owned subsidiary of Emera (formerly NS Power Holdings Inc.), a diversified energy and services company. Not listed in the DBRS industry study are Fortis, Great Lakes Power, and Hydro One. Fortis is the parent company of Newfoundland Light & Power and Maritime Electric Company, a relatively thinly traded company. Great Lakes Power Inc. is a wholly owned subsidiary of Brascan Corporation and is not publicy traded. Hydro One Inc., which holds and operates the largest transmission and distribution asset network in Ontario, is wholly owned by the Province of Ontario and not publicly traded.

In its 2001 study of the Canadian Gas and Electricity Distribution Utilities, DBRS includes the following companies, several of which are either government-owned or operating companies of larger diversified companies:

AltaGas Utilities (wholly owned by AltaGas Services)
BC Gas Utility (wholly owned by BC Gas Inc.)
Centra Gas BC (wholly owned by Westcoast Energy)
Centra Gas Manitoba (wholly owned by Manitoba Hydro-Electric)
Consumers' Gas (wholly owned by Enbridge)
CU Inc. (wholly owned by Canadian Utilities Ltd)
ENMAX (wholly owned by City of Calgary)
Gaz Metro (limited partnership)
Hydro One (wholly owned by Province of Ontario)
Maritime Electric (wholly owned by Fortis)
Newfoundland Power (wholly owned by Fortis)
SaskEnergy (wholly owned by Province of Saskatchewan)
Union Gas (wholly owned by Westcoast Energy)

The major point of all this is that there is a severe paucity of investor-owned widely-traded energy distribution utilities in Canada. The historical data for the few companies that are available are often distorted by multiple changes in ownership and corporate restructurings. Moreover, several of the energy utilities are thinly traded, endangering the reliability of market-based measures, such as the beta risk measure discussed later. These difficulties are not nearly so acute in the U.S. because of much larger sample size of regulated energy utilities compared to Canada.

There are additional practical difficulties in implementing the DCF at a particular point in time. They are briefly described in Appendix B. From a purely practical viewpoint, the DCF model is difficult to apply to Canadian electric utilities data. As stated earlier, there are very few "degrees of freedom" and very few comparable risk pure-play electric distribution utilities like HQ Distribution with clean homogeneous historical financial data, and, therefore, the DCF results are likely to prove unreliable. Also, it is difficult to obtain a meaningful proxy for the perpetual growth component of the DCF model due to the paucity of analysts growth forecasts in Canada. These difficulties are not nearly so acute in the U.S. because of much larger sample size of electric utilities compared to Canada and because of the wide availability of analysts' growth forecasts[1].

The Comparable Earnings method can be computationally prohibitive and somewhat incompatible with administrative simplicity and streamlined regulation. Should the Régie conclude that the method should still play a role in defining a fair and reasonable ROE, implementation should follow the general directions which I have outlined in Appendix A and which I have described in prior testimonies before the Régie.

Therefore, I have relied principally, although not exclusively, on the CAPM and Risk Premium methodologies. I examined the risk premiums allowed by North American regulators. I have also applied the DCF model to U.S. combination gas and electric distribution utilities and to natural gas distribution utilities in order to supplement the Risk Premium estimates.

I. 3 DIVISIONAL COST OF CAPITAL

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[1] These difficulties are somewhat circumvented when applying the DCF model to a market aggregate or to a stock market index or when applying the model over several time periods.

Because risk-averse investors require higher returns from higher risk investments, the expected return, or cost of capital, for a higher risk investment exceeds that of a lower risk investment. Viewing the various unbundled businesses of a vertically integrated electric utility (generation, transmission, distribution) on a stand-alone basis just like any other corporate investment, the higher the risk of that investment, the higher the expected return. In theory, the latter can be calculated for each individual business segment as long as reliable and relevant market and historical information are available on each entity and/or on comparable risk investments which are publicly-traded.

Under the "stand alone" approach, HQ Distribution is viewed as an independent operating company, and its cost of equity is inferred as the cost of equity of comparable risk firms. The “stand alone” approach is predicated on the opportunity cost principle of economics, whereby the cost of any resource, including capital, is the cost of an alternative foregone. Therefore, the cost of equity capital is the risk-adjusted opportunity cost to the investors, regardless of their identity. The relevant considerations in calculating HQ Distribution's cost of capital are the alternatives available to investors and the returns and risks associated with those alternatives. The identity of a company’s shareholders should have no bearing on its cost of equity because it is the risk to which the company’s equity is exposed which governs its cost of money. Had HQ Distribution's stock been widely held by the public, the company would be entitled to a return which would fully cover the cost of both its debt and equity.

To estimate the cost of equity capital for HQ Distribution, I have used the Pure-Play methodology. The approach consists of identifying publicly-traded companies which are most similar to the business segment in question, and then applying the traditional cost of capital methodologies to the proxy firms. The average cost of equity for these companies can be used as an estimate of equity cost for the business segment. For example, to the extent that an electricity distribution business such as HQ Distribution has a risk profile similar to today’s natural gas distribution business, the betas of natural gas distribution utilities can be used as proxies for the unobservable beta of HQ Distribution and inserted into the CAPM to infer the cost of capital for that business. I reiterate my ealier concern on the scarcity of pure-play investor-owned widely-traded Canadian utility companies.

II. RISK ENVIRONMENT

It is convenient to disaggregate HQ Distribution's risk into three broad components: business risk, regulatory risk, and financial risk.

TOTAL RISK = BUSINESS RISK + REGULATORY RISK + FINANCIAL RISK

Business risk refers to the relative variability of operating profits induced by the external forces of demand for and supply of the firm's products, by the presence of fixed costs and the extent of diversification. Regulatory risk refers to the quality and consistency of regulation applied to a given utility and to the fairness and reasonableness of regulatory decisions. Financial risk refers to the additional variability of earnings induced by the employment of fixed cost financing, that is, debt and preferred stock capital.

Relative to other Canadian energy utilities, HQ Distribution possesses average business risks, above average regulatory risk and slightly above average financial risks. The net result is that HQ Distribution's overall risk is slightly above average, relative to other energy utilities. Each of these risks is addressed in more details below.

II. 1. BUSINESS RISK

General Considerations

Business risk encompasses all the operating factors which collectively increase the probability that expected future income flows accruing to investors may not be realized, because of the fundamental nature of the firm's business. Business risk is due to sales volatility and operating leverage. Sales volatility refers to the uncertainty in the demand for the firm's products due in part to external non-controllable factors, such as the basic cyclicality of the firm's products, the products' income and price elasticity, the amount of competition, the availability of product substitutes, the risk of technological obsolescence, the degree of regulation, and the conditions of the labor and raw materials markets.

The business risk of utilities is assessed by examining the strength of long-term demand for utility products and services. The size and growth rate of the market, the diversity of customer base and its economic solidity, the availability of substitutes and degree of competition, the utility's relative competitive standing in its major markets, including residential, industrial and commercial markets all impact business risk.

Sales volatility is also related to internal or controllable factors. The reactions of a firm's management to the business environment, such as the adoption of a particular cost structure, are important dimensions of business risk. If all operating costs are variable, then operating income varies proportionately to sales variability. If as is the case for utilities, a large portion of costs are fixed, then operating income will be far more volatile than sales. This magnification effect of fixed costs on the variability of operating income is referred to as "operating leverage".

Operating efficiency from the standpoint of cost and quality of service is another factor which may influence a utility's competitive risk exposure. Other examples of internal risk factors include the degree of diversification in the firm's asset structure, managerial efficiency, growth strategy, research and development policies, and competitive posture.

The size of a utility's construction program is also a source of business risk, to the extent that new construction is to meet projected demand, and that the latter is more difficult to forecast than existing demand. This forecasting risk can be compounded by regulatory lag and attrition.

Any factor which complicates the investor's ability to assess future prospects will accentuate business risk and regulatory risk.

HQ Distribution’s Business Risks

I view HQ Distribution as comparable in business risk to other regulated energy utilities and higher in business risk than TransEnergie. Competition has primarily affected generation thus far, while transmission and distribution remain largely regulated monopolies for now. The industry composition in terms of assets is approximately 50% generation, 15% transmission, and 35% distribution as of 2001 year-end. The corresponding composition for Hydro-Québec is very similar to the industry at 50%, 32%, and 18%, respectively. This means that at least one-half of assets are subject to competitive forces.

While generation certainly is by far the most vulnerable asset class in light of complex operating risks and the increasingly competitive nature of the business, the business risks of the distribution function have intensified as well, due to the intensifying competition in the energy services business and to regulatory uncertainties.

It is my view that the electricity distribution business will gradually evolve into two distinct businesses, a facilities-based distribution business and a customer-focused energy service business.

The capital-intensive, facilities-based distribution segment will continue to offer common carrier service under fairly traditional monopolistic conditions, and is likely to retain many of the characteristics that used to apply to all utilities: a monopoly on supply (until, of course, customer choice is allowed), a cost-plus mark-up based on orthodox rate of return/rate base regulation and growth depending on the economics of its service territory. The distribution utility will continue to retain the excess baggage and remnants of traditional regulation, including social policy, cross-subsidization, the obligation to serve regardless of costs, and the obligation to purchase power for an unknown and varying group of its ratepayers as a provider of last resort. The latter will result in supply (power procurement) risks.

Rates are very likely to continue being set under the auspices of rate of return/rate base regulation augmented by some form of performance-based ratemaking or incentive regulation.

In the medium-term, the business risk profile of the distribution segment is likely to remain at current levels relative to industrials, with upside profitability largely constrained by regulation. In the longer-term, when the full forces of customer choice come to bear, the facilities-based segment will experience much of the same risk intensification that the generation segment is undergoing now. For example, competition from distributed generation and multi-fuel companies will augment risk in the long-term.

The low capital-intensity energy service business (metering, billing, etc.) is likely to evolve into a far more competitive business, with regulation likely to recede substantially, offering more upside profitability. Only those players with a sustainable competitive advantage will prevail. Achievement of the latter will depend on several factors, including the ability to develop unbundled products and creative pricing, good service reputations, and good knowledge of customer needs. It is not unreasonable to foresee corporate mergers and recombinations in this segment of the distribution business, in the pursuit of economies of scale in promotion and advertising and the ability to establish a national presence.

The gap in risk between generation and the wires business is likely to be much larger for Hydro-Québec than for other North American investor-owned electric utilities at this time. The majority of the business risks faced by Hydro-Québec are shouldered by the generation activities, which face risk on both the demand and supply side. On the demand side, its revenues are vulnerable to the business cycle, particularly those from its industrial customers. Cross-border sales are unpredictable due to the competitive context. Not only are the revenues cyclical, but also rates are frozen until the year 2003, after which they will be reviewed by the Régie. On the supply side, the generation unit is extremely vulnerable to fluctuating water levels.

The wires business remains largely monopolistic for now. As I argued before the Regie in my testimony on behalf of TransEnergie, the transmission component possesses low business risk by virtue of the ratemaking process, whereby rates cover the costs of providing service, regardless of variations in volume of electricity sold. The distribution component, while riskier than transmission, retains the features of the traditional regulated monopoly.

It is safe to conclude that 1) the distribution segment's business risk is somewhat less risky than the generation segment and is comparable to that of traditional energy distribution utilities, such as natural gas and electricity distributors, and 2) the generation segment's business risk exceeds that of the transmission-distribution business and is close to that of the average equity investment.

To the extent that budgeted forecasts are made prior to regulatory determination of its rates, HQ Distribution's principal source of business risk is forecasting risk. Potential deviations from expected profitability can occur due to unanticipated increases/decreases in costs, such as interest rates and exchange rates, and due to unanticipated decreases/increases in revenues due to unforeseen economic cyclical variations and/or vagaries in weather.

HQ Distribution sells electricity distribution services at regulated rates to customers whose energy demand is primarily dependent on the state of the economy (business cycle, work stoppages, factory closings, etc.) and the weather. With respect to weather-induced risk, HQ Distribution operates in a relatively harsh climate with wide variations, imparting uncertainty to the revenue stream and exerting pressure on the physical assets. From year-to-year, sales to both the residential and commercial sectors (space heating load) are sensitive to weather fluctuations. As a result of the variability induced by economic cycles and weather uncertainties, HQ Distribution requires reasonable access to capital markets at all times. To illustrate, the ravaging ice storms of January 1998, for example, exploded HQ Distribution's capital expenditures budget over the next few years following the storm.

Another potential source of risk to HQ Distribution is competition from alternate fuels, mainly natural gas. Although HQ Distribution is exposed to the risk of market loss to natural gas, the gains in market share by natural gas are likely to be tempered by the relatively high capital costs of furnace conversion. However, if the recent declines in natural gas prices are sustained, natural gas could become an increasingly attractive energy alternative from both a price and environmental perspective.

An additional source of business risk is driven by the uneconomic cross-subsidies that remain in the rate structure. Cost-conscious industrial-commercial users with viable least-cost alternatives are prime targets for new cream-skimming competitors, to the extent that rates are not reflective of costs. To the extent the rate structure continues to reflect public policy for services rather than pricing based on economic costs, opportunities for competitive cream skimming are created. There are incentives for some large volume users to bypass the network and/or to seek alternative energy providers to meet their energy requirements. Because large volume users represent a substantial proportion of total revenues, the loss of this business could have serious financial consequences. This risk can be compounded by the lack of pricing flexibility in dealing with large users.

Another component of HQ Distribution’s business risk is the nature its cost structure. If all production costs are variable, then operating income varies proportionately to sales variability. But, as is the case for HQ Distribution, if a very large portion of costs are fixed and if there is very limited managerial manoeuvrability to reduce costs, operating income is far more volatile than sales. This magnification effect of fixed costs on the variability of operating income is known as "operating leverage" and is especially acute for HQ Distribution.

Finally, another source of business risk stems from HQ Distribution’s obligation to serve. To the extent that customer rates in a given customer class are uniform throughout the service territory and are set based on province-wide fully allocated costs rather than on the basis of marginal costs, HQ Distribution’s obligation to provide service regardless of costs can produce economic losses.

The net effect of all these business risk factors is that HQ Distribution's business risks are comparable to the utility industry average and similar to those of electricity and natural gas distribution utilities. Standard & Poor’s, the new parent of Canadian Bond Rating Service, utilizes a business risk ranking system of 1-10 for utilities whose debt securities it rates, with “1” being the least risky and “10” being the most risky. According to S&P, wires-only companies generally have rankings of “4” or less; integrated utilities (including generation) are typically rated in the “3” - “7” range. The average rating of the regulated subsidiaries of all U.S. electrics is “4”. By comparison, the average business profile of the U.S. natural gas distributors, which are analogous to the “wires” part of the electric utility industry, are ranked, on average, “3”. Based on my review of its various business risks, HQ Distribution would be ranked in the “3” - “4” range.

HQ Distribution’ business risk is certainly higher than TransEnergie’s. Unlike HQ Distribution, TransEnergie's future revenues are largely tied to its sales to HQ Distribution. To the extent that TransEnergie's costs are largely passed on to HQ Distribution and rolled in the latter’s costs of service for ratemaking purposes, TransEnergie is relatively shielded from the fate of HQ Distribution’s sales volume and is relatively assured of recovering its costs and a fair return on capital invested.

II. 2 REGULATORY RISK

An important component of business risk for utilities is "regulatory risk". The regulatory framework in which a utility operates is a pivotal aspect of risk from the investors’ perspective. The investment community is very conscious of the regulatory environment, as evidenced in the reports of both bond rating agencies and investment analysts. Regulatory risk generally refers to the quality and consistency of regulation applied to a given regulated utility and specifically to the fairness and reasonableness of rate awards. By allowing returns that are inconsistent with informed investors’ risk perceptions, or by disallowing prudently incurred costs and capital investments, or by approving rate designs that are insufficient to recover fixed costs, or by allowing capital structures that are inconsistent with business risks and out of line with those of comparable risk utilities, regulation can certainly expose utilities to enormous risks. Other determinants of regulatory risk include specific policy parameters such as the average regulatory lag inherent in regulatory procedures in a given jurisdiction, the use of forward vs historical test years, and whether the utility has the opportunity to earn the authorized return .

High-quality regulation will mitigate risks that are outside managerial control, and will allow returns that provide both fair compensation for the risks that are left with management, and incentives to achieve the allowed return through continued improvement in productivity. Regulation can provide a supportive environment characterized by even-handedness, fairness, reasonableness, consistency, and by allowing the utility an opportunity to achieve a fair return with a reasonably high probability.

HQ Distribution's regulatory risks remain slightly above average at the present time, relative to other regulated utilities in Canada. The company's electricity distribution operations are subject to the regulatory scrutiny of the Régie de L'Energie du Québec for the first time. In the absence of a firm track record for regulating HQ Distribution, investors remain concerned about regulatory policy. Will HQ Distribution enjoy fair and reasonable regulatory treatment under the Régie as was the case for the other utilities regulated by the Regie and as was the case in the Regie's only rate decision for Hydro Quebec, namely TransEnergie? The enormous regulatory lag involved in the TransEnergie docket, namely some four years of burdensome hearings with a myriad intervenors, is well beyond the bounds of regulatory practice in North America. Although the decision was certainly generally fair and reasonable in terms of the rate of return and deemed capital structure awarded, and augurs well for the quality of future regulation of HQ Distribution, other aspects of the decision, namely in the area of rate design, are such that TransEnergie does not possess a reasonable opportunity to actually earn the allowed return, enhancing regulatory risk.

II. 3 FINANCIAL RISK

Financial risk stems from the method used by the firm to finance its investments and is reflected in its capital structure. It refers to the additional variability imparted to income available to common shareholders by the employment of fixed cost financing, that is, debt capital. Although the use of fixed cost capital can offer financial advantages through the possibility of leverage of earnings, it creates additional risk due to the fixed contractual obligations associated with such capital. Debt carries fixed charge burdens which must be supported by the company's earnings before any return can be made available to the common shareholder. The greater the percentage of fixed charges to the total income of the company, the greater the financial risk. The use of fixed cost financing introduces additional variability into the pattern of net earnings over and above that already conferred by business risk.

Variations in operating earnings cause amplified variations in equity returns when debt financing is used. The spread in equity returns is wider in the case of debt financing, and the greater the leverage, the greater the spread and the greater the cost of common equity.

HQ Distribution's very high debt ratio makes it particularly vulnerable to financial risk. HQ Distribution's high level of financial leverage restricts its interest and fixed-charge coverage ratios. As discussed fully in section IV of my testimony, the company's financial risks are higher than those of other publicly-owned electric utilities, and substantially exceed those of other Canadian investor-owned energy utilities.

The net result of this medley of risk factors is that HQ Distribution possesses slightly above average total risks among energy utilities. HQ Distribution’s above average financial risks and regulatory risks combined with its average business risks results in a slightly above average total investment risk.

III. RATE OF RETURN ESTIMATES

In view of the practical limitations of the DCF and Comparable Earnings methodologies applied to individual companies at this time, discussed in Appendix A, I have relied principally on the CAPM and Risk Premium methodologies in arriving at my final ROE recommendation. I have performed six risk premium studies. The first two studies deal with aggregate stock market risk premium evidence and the other four deal directly with the energy utility industry. I have also examined the risk premiums allowed by North American regulators.

III. 1 RISK PREMIUM: CAPM ESTIMATE

Earlier, I discussed the CAPM, which states that the return required by investors, K, is made up of a risk-free component, R_F, plus a risk premium given by $\beta(R_M - R_F)$. To derive the CAPM risk premium estimate, two quantities are required: beta, β, and the market risk premium, $(R_M - R_F)$. For beta, I used 0.67, based on the historical betas of comparable utilities and the betas of electric utilities prior to deregulation. For the market risk premium, I used 6.7%. These inputs to the CAPM are explained below.

III. 1. A Beta Estimates

Because HQ Distribution is an administrative unit of Hydro-Québec and neither are publicly-traded entities, beta must be inferred from comparable risk publicly-traded companies.

I reiterate my earlier caution that there is only a small handful of undiversified pure-play energy distribution utilities in Canada whose shares are publicly listed and actively traded, and are therefore subject to the opinions and actions of investors in a measurable way. In contrast, the U.S. energy industry, both electric and gas, is made up of over 150 utilities. Given this situation, the need to extend the very small sample of Canadian utilities to include other utility companies of comparable risk is obvious. Moreover, the statistical reliability of U.S. studies exceeds that of Canadian studies in view of the much larger sample sizes and the continuity in the data.

I examined several proxies for HQ Distribution beta: publicly-traded Canadian energy utilities, U.S. electric utilities, particularly those with a high component of distribution assets, and natural gas distribution utilities. I have employed the common practice of using adjusted betas, rather than raw betas, as recommended in most college-level investment textbooks and as routinely calculated and utilized by large and well-known investment services such as Value Line, Bloomberg, and Merrill Lynch, including the Canadian edition of Value Line. The use of adjusted betas is also consistent with the preponderance of the academic empirical literature on the subject. Appendix C discusses more fully the appropriateness of employing adjusted betas for utility companies as well as for industrials. I have also examined the betas implied in the ROEs allowed by North American regulators in past years in support of the use of adjusted betas.

The betas reported in the May 2002 edition of the Value Line Investment Survey for Windows for Canadian and energy utilities are displayed in Exhibit RAM-2. The average beta for the Canadian sample of energy utilities is 0.58. For those companies for which there is relatively thin trading, such as Fortis and Pacific Northern Gas, beta estimates are downward biased. This is because observed returns contain stale information about past period returns rather than current period returns.[2] Adjustment for the thin trading effect increases the beta estimate. Removing the two aforementioned thinly traded companies, the average beta for the group is 0.60.

It is reasonable to postulate that Hydro-Quebec's electricity distribution business possesses an investment risk profile comparable to that of today's natural gas distribution utility business. Unlike the Canadian natural gas industry where there are very few publicly-traded investor-owned pure-play gas distributors with continuous historical data[3], the U.S. natural gas distribution industry is fairly homogeneous and composed of a large number of publicly-traded investor-owned companies. These natural gas utility companies possess economic characteristics similar to those of electric distribution utilities. They are both involved in the distribution of energy services products at regulated rates in a cyclical and weather-sensitive market. They both employ a capital-intensive network with similar physical characteristics. They are both subject to rate of return regulation. Moreover, the gas industry is somewhat ahead of the electric utility industry on the road to restructuring, and hence its beta is more representative of the beta likely to prevail in the future for the restructured electric

[2] Intuitively, suppose the stock market index surges forward but that an individual company stock price remains unchanged due to lack of trading, the estimated beta is imparted a downward bias. The stock is unable to catch up to market-wide movements and appears to be a lower beta stock.

[3] For example, Union Gas and Centra Gas BC are wholly owned by Westcoast Energy. Centra Gas Manitoba is owned by the Manitoba Hydro-Electric Board, Consumers Gas is wholly owned by Enbridge. Gaz Metropolitain is a limited partnership.

utility industry. As a proxy for the electricity distribution business beta, I have therefore examined the betas of a sample of publicly-traded natural gas distribution utilities contained in the Value Line Investment Survey for Windows ("VLIS") of May 2002. In order to minimize the well-known thin trading bias in measuring beta, only those companies whose market capitalization exceeded $500 million were considered. The group of fifteen companies is shown on Exhibit RAM-3. The average beta for the group is 0.64.

Given that the intensity of competition and restructuring in Canada has not yet attained that of the U.S., it is not unreasonable to postulate that HQ Distribution's beta is comparable to that of the U.S. electric utilities with a high component of distribution assets prior to the unleashing of competitive and restructuring forces in the late 1990s. The beta estimates are shown in Exhibit RAM-4 for 1997 prior to the electric utility industry's massive restructuring which intensified in 1998. The average beta for the group was 0.70, and steadily increased during the period 1992-1997 prior to formal restructuring from about 0.60 to 0.70, as shown in the first graph in Exhibit RAM-4 Page 2.

As a supplementary proxy for HQ Distribution's risk, I examined the risk statistics for natural gas transmission companies. It is reasonable to postulate that HQ Distribution's possesses an investment risk profile at least equal to, if not greater than, today's natural gas transmission utility business. Page 1 of Exhibit RAM-5 shows the behavior of beta for a large sample of gas transmission pipelines over the past several years. The beta risk measure for the natural gas transmission utilities has fluctuated narrowly between 0.60 and 0.70 over the period, and is currently 0.65.

There is another methodology which can be used to infer HQ Distribution's beta. Given a company's stock beta ("levered beta") and its equity ratio, an unlevered beta, purged from any financial risk, can be computed. This unlevered beta, or pure business risk beta, measures the business risk component of the firm's total risk, or, alternately, what the company's beta would be in the absence of debt financing (all-equity financing).

The fundamental idea is contained in the following relationship:

Unlevered Beta = Levered Beta x Equity Ratio

$$\beta_U \quad = \quad \beta_L \times E/C \qquad (3)$$

where β_U is the unlevered beta, β_L is the levered beta, E is the amount of equity capital, and C is the total capital invested. The ratio E/C is the equity ratio. For example, for a utility with an equity ratio of 40% and a beta of 0.70, its unlevered beta is 0.70 x 0.40 = 0.28

Exhibit RAM-6 shows the calculation of unlevered betas for Canadian utility companies, given their equity ratio and stock beta. The average unlevered beta, or pure business risk beta, is 0.22, with little variability between companies.

A beta for HQ Distribution can be inferred, using the same relationship in reverse. Given HQ Distribution's business risk beta and common equity ratio, its stock beta can be computed from equation 3 above. If we assume that HQ Distribution's business risk is equal to the average of 0.22 for Canadian energy utilities based on my earlier analysis of HQ Distribution's business risks, and we use Hydro-Quebec's non-consolidated capital structure consisting of about 27% common equity capital, HQ Distribution's beta would be 0.22/0.27 = 0.81. Using the lower end of my recommended capital structure of 35% - 40% common equity capital discussed later in my testimony, HQ Distribution's beta would be 0.22/0.35 = 0.63.

Implied Regulatory Beta

The CAPM framework can be used to quantify the beta implicit in the allowed risk premiums for regulated utilities. According to the CAPM, the risk premium is equal to beta times the market risk premium:

$$\text{Risk Premium} \quad = \quad \beta\,(R_M \; - \; R_F)$$

Solving for beta, we obtain:

$$\beta \quad = \quad \text{Risk Premium} \,/\, (R_M \; - \; R_F)$$

Therefore, I examined Canadian regulators' rate of return authorizations over the period 1980-1994 and subtracted the corresponding level of long-term

Canada yields so as to measure the allowed risk premium. The period of examination ended in 1994 because of the proliferation of formulaic approaches in setting allowed rate of return on equity throughout Canada. I inserted the ROE authorized in these decisions and the contemporaneous long-term Canada yield in the above CAPM-based equation for beta. The beta implicit in those decisions was in the range of 0.60 - 0.70[4].

I also examined the betas implied in hundreds of regulatory decisions for electric and gas distribution utilities in the United States over the period 1987-2001[5]. Using the allowed average risk premium of 4.51% in several hundred decisions and a market risk premium of 6.5%, the implied beta is 0.69. Using a market risk premium of 7%, the implied beta is 0.64.

A more careful review of these ROE decisions relative to interest rate trends reveals a narrowing of the risk premium in times of high and volatile interest rates, and a widening of the premium as interest rates fall. The current long-term Treasury bond yield of 6% suggests an allowed risk premium of 5.6%. The implied beta for the regulated activities would then rise above 0.80.

The table below recapitulates the average beta from the various samples. The average beta from the various sources is 0.67. I conclude from all these analyses that an appropriate beta for HQ Distribution lies in the upper half of a 0.60 – 0.70 range. I shall use 0.67 as my estimate of HQ Distribution's beta in the CAPM and ECAPM analyses to follow.

Recapitulation of Beta Estimates

Sample	**Beta**
Canadian energy utilities	0.60
Natural gas utilities	0.64
U.S. Electric utilities	0.70
Gas transmission utilities	0.65

[4] The beta estimate implied in the Regie`s 9.66% allowed return for TransEnergie is nearly 0.60. Inserting the Regie`s allowed return of 9.66%, the risk-free rate of 6% and market risk premium of 6.44% used by the Regie in the standard CAPM equation, and solving for the implied beta, yields a beta of nearly 0.60.

[5] This study is described in more details later in my testimony.

Unlevered-levered beta	0.63-0.81
Regulatory betas Canada	0.60-0.70
Regulatory betas U. S.	0.64-0.80
Average	**0.67**

III. 1. B. Market Risk Premium

For the market risk premium component of the CAPM, I used 6.7%. This estimate was based on the results of both historical and forward-looking studies of long-term risk premiums in North American capital markets. Six studies guided the assumed range, four of which rely on Canadian market data and two on U.S. market data.

(1) The Hatch-White compilation of historical returns on Canadian securities from 1950 to 1987 shows that a broad market sample of common stocks outperformed long-term Canada bonds by 6.9%, or close to 7%. For reference, see *Canadian Stocks, Bonds, Bills and Inflation: 1950-1987*, James E. Hatch and Robert W. White, The Financial Analyst Research Foundation, 1988.

(2) The annual update to the Canadian Institute of Actuaries study, *Report on Canadian Economic Statistics 1924 - 2001*, shows that the average observed aggregate risk premium between stocks and long-term government bonds over a very long period is equal to 5.7%.

(3) The Ibbotson Associates study, *Canadian Risk Premium Over Time Report, 1936-1999*, compiles historical security returns from 1936 to 1999 and shows that a broad market sample of common stocks outperformed long-term Canada government bonds by 5.5%. The historical market risk premium over the income component of long-term bonds rather than over the total return is presumably higher, but is unreported in the Ibbotson Associates study.

(4) In U.S. capital markets, the Ibbotson Associates study, *Stocks, Bonds, Bills, and Inflation, 2002 Yearbook*, compiles historical security returns from 1926 to 2001 and shows that a broad market sample of common stocks outperformed

long-term U.S. government bonds by 7.0%. The historical market risk premium over the income component of long-term Treasury bonds rather than over the total return is 7.5%. Ibbotson Associates recommend the use of the latter as a more reliable estimate of the historical market risk premium.

I have employed returns realized over long time periods rather than returns realized over more recent time periods because realized returns can be substantially different from prospective returns anticipated by investors, especially when measured over short time periods. A risk premium study should consider the longest possible period for which data are available. Short-run periods during which investors earned a lower risk premium than they expected are offset by short-run periods during which investors earned a higher risk premium than they expected. Moreover, the use of the entire study period in estimating the appropriate market risk premium minimizes subjective judgment and encompasses many diverse regimes of inflation, interest rate cycles, and economic cycles.

From a statistical viewpoint, to the extent that the historical equity risk premium estimated follows what is known in statistics as a random walk, one should expect the equity risk premium to remain at its historical mean. The best estimate of the future risk premium is the historical mean. Since I found no evidence that the market price of risk or the amount of risk in common stocks has changed over time, that is, no significant serial correlation in either the CIA or the Ibbotson studies, it is reasonable to assume that these quantities will remain stable in the future.

When using historical risk premiums as a surrogate for the expected market risk premium, the only relevant measure of the historical risk premium is the arithmetic average of annual risk premiums over a long period of time. When estimating the cost of capital, only arithmetic means are correct. Looking forward, the expected return is an arithmetic mean. Looking backward, the historical achieved return is a geometric average. In statistical parlance, the arithmetic average is the unbiased measure of the expected value of repeated observations of a random variable, not the geometric mean. Only arithmetic averages can be used as estimates of cost of capital, and that the geometric mean is not an appropriate measure of cost of capital[6].

(5) For the fifth guide to my chosen range of market risk premiums, I applied a DCF analysis to the aggregate Canadian equity market (Toronto Stock Exchange) using Value Line's "Value Line Investment Survey for Windows" ("VLIS") software. Excluding high-growth stocks, the dividend yield on the aggregate market is currently 2.1% (VLIS 05/2002 edition), and the projected growth for the Value Line common stocks is in the range of 5.4% to 15.1%. Adding the two components together produces an expected return on the aggregate equity market in the range of 7.5% to 17.2%, with a midpoint of 12.4%. Following the tenets of the DCF model, the spot dividend yield must be converted into an expected dividend yield by multiplying it by one plus the growth rate. This brings the expected return on the aggregate equity market to 12.6%. Recognition of the quarterly timing of dividend payments rather than the annual timing of dividends assumed in the annual DCF model brings this estimate to 12.8%. The implied risk premium is therefore about 6.8% over long-term Canada bonds which are yielding 6.0% currently.

(6) For the sixth guide to my chosen range of market risk premiums, I applied a DCF analysis to the U.S. aggregate equity market using the VLIS software[7]. The dividend yield on the aggregate market is currently 2.2% (VLIS 05/2002 edition), and the projected growth for the nearly 5000 dividend-paying stocks covered by Value Line is in the range of 5.3% to 13.8% with a midpoint of 9.6%. Adding the dividend yield to the midpoint growth rate produces an expected return on the aggregate equity market of 11.8%. Following the tenets

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[6] This is formally shown in Morin, R.A., Regulatory Finance, Public Utilities Report Inc., Arlington, Va., 1994, Chapter 11 and in Brealey, R. and Myers, S., Principles of Corporate Finance, McGraw-Hill, 5th ed., New York, 1997, Chapter 8.

[7] The prospective risk premium study of the U.S. equity market using the DCF approach was performed on a very large sample of companies, close to 5000 companies, in contrast to the same study performed on the Canadian equity market which was made up of far fewer companies, and several of those did not even have earnings/dividend forecasts. Therefore, the statistical reliability of the U.S. study far exceeds that of the Canadian study.

of the DCF model, the spot dividend yield must be converted into an expected dividend yield by multiplying it by one plus the growth rate. This brings the expected return on the aggregate equity market to 12.0%. Recognition of the quarterly timing of dividend payments rather than the annual timing of dividends assumed in the annual DCF model brings this estimate to approximately 12.2%. The implied risk premium is therefore 6.5% over long-term U.S. Treasury bonds that are currently yielding 5.7%. Moreover, Value Line forecasts a price appreciation of 60% over the next four years for the companies that make up the Value Line Composite Index, implying an annual appreciation of 12.5%. Coupled with the forecast dividend yield of 1.6%, the implied market return is 14.1%. The implied risk premium is therefore 8.4% over long-term U.S. Treasury bonds that are currently yielding 5.7%. Thus, Value Line's prospective market risk premium lies in a range of 6.5% to 8.4%, with a midpoint of 7.5%

Recapitulating, the market risk premium estimates from the six studies are as follows:

Historical Hatch-White Canada	6.9%
Historical Cdn. Inst. Actuaries Canada	5.7%
Historical Ibbotson Associates Canada	5.5%
Historical Ibbotson Associates U.S.	7.5%
Prospective Value Line Canada	6.8%
Prospective Value Line U.S.	7.5%

Average	6.7%

The average from all the historical and prospective estimates is 6.7%, which is my final estimate of the market risk premium. The computation of the average gives approximately 2/3 weight to the Canadian results and 1/3 weight to the U. S. results.

Consideration of the U.S. results is certainly justified, given the exponential increase in the degree of integration between the Canadian and U.S. capital markets in the last decades, as the barriers to entry in global capital markets have eroded. Canadian investors and analysts do compare U.S. equities with Canadian equities when making investment decisions.

Not only is a continental energy market developing, but world financial markets are unifying. A dramatic development of the last decade has been the integration of world financial markets into one global "supermarket". There is considerable evidence that national capital markets remain imperfectly integrated but are converging rapidly toward integration. For example, a December 1992 paper (Mitoo, U.R., "Additional Evidence on Integration in the Canadian Stock Market", Journal of Finance, December 1992) finds strong evidence of an increasing degree of integration over time between the Canadian and U.S. equity markets. The degree of integration has accelerated markedly since that particular study. Recent evidence demonstrates that the degree of cross-correlation between domestic equity markets has increased in the last twenty five years from an average of 0.53 throughout 1974 – 2001 to a current level of 0.78 in 2001, according to the international equity investing statistics reported the Ibbotson Associates study, *Stocks, Bonds, Bills, and Inflation, 2002 Yearbook*. This is consistent with a rising degree of interconnection and integration between various domestic equity markets.

Global corporations and global investors are well-positioned to access this market, and arbitrage short-run disparities in the cost of funds between markets. Their activity tends to drive national capital costs toward a single global standard. When capital flows freely from one location to another, competitive forces of supply and demand will quickly eliminate any price or rate of return disparities, other than those arising from differences in risk. Thus cost of capital differences cannot persist in an integrated capital market. The long-run tendency for real interest rates and exchange rates to revert to parity suggests an integrated capital market.

Capital markets are radically different now than in the 1980's and 1990's. Transactions, diversification, and taxation barriers to investment in foreign securities by Canadian investors have eroded. It is now easier to purchase and sell shares traded on foreign exchanges. More shares of foreign companies are now interlisted on Canadian and US exchanges. The purchase of ADRs and ADSs provides access to equity investments in foreign companies. A wide range of mutual funds with an international focus exists in Canada and the U.S. To illustrate, low-cost foreign index funds called "WEBS", an acronym for World Equity Benchmark Shares, eliminate some of the guesswork and costs of investing internationally. Each WEBS Index Series seeks to match the performance of a specific Morgan Stanley Capital International (MSCI) index.

The arguments for international investments are more powerful than ever, including superior performance, diversification, and the improvement of the risk/return tradeoff. The performance of international stocks has exceeded domestic stocks from 1970 to 2001. Diversification provides a substantial benefit of international investing. By spreasding risks among different domestic equity markets, investors can achieve lower risks and/or improve investment returns. Not only have global portfolios outperformed individual domestic markets over the 1969-2001 period, but risk reductions have been achieved as well[8]. Most college-level investment textbooks document the effects of diversification whereby adding to a portfolio assets that are not perfectly correlated will enhance the return/risk reward. The imperfect correlation across national boundaries allows for the improvement in diversification potential[9].

Foreign content restrictions have been loosened considerably. The level of foreign content permitted in RRSP portfolios has risen to 30% in Canada, which can effectively be increased to over 50% by investing the remaining 70% in shares of mutual funds which in turn have a foreign content of 30%. Cross-border access to capital by corporations is facilitated by the use of the multi-

[8] Harvey, C. R., "The World Price of Covariance Risk," *Journal of Finance*, March 1991.
[9] In a paper in Journal of Portfolio Management written by a portfolio manager at Batterymarch Financial Management, the author demonstrates the superior efficiency gains from investing in

jurisdictional prospectus for new issues in North American capital markets, while international communications networks and equipment have facilitated the access to information on foreign securities. Global diversification is actively promoted by the investment community and by the investment academic literature.

In short, the integration and linkages between the U.S. and Canadian capital markets have greatly solidified in the last decade, and U.S. data are clearly relevant to both Canadian and U.S. investors. Of course, Hydro-Québec is an active and large player in world financial markets with some 50% of its debt denominated in U.S. dollars.

The tax differences between Canada and the U.S. do not substantially bias the comparisons between the two markets. The tax regime differentials as between Canada and the U.S. are relatively minor. The statutory federal tax rate on all income is very similar to the tax rate on equity income in Canada. While the dividend tax credit did confer special tax benefits on Canadian investors when it was originally instituted, successive federal budgets over the years have diminished the beneficial effects of the dividend tax credit.

The risk similarities between Canadian and U.S. utility stocks far outweigh the remaining dissimilarities in tax regime. Besides, taxes are not relevant for non-taxable investors such as pension funds who conduct a good part of the trading on the market.

III. 1. C. CAPM Risk Premium Estimate

Using those input values, namely a beta of 0.67 and a market risk premium of 6.7%, my CAPM estimate of HQ Distribution's risk premium is 0.67 multiplied by 6.7%, or 4.5%.

III. 1. D. Empirical CAPM Risk Premium Estimate

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non-U.S. stocks. See Wilcox, J. W., "EAFE is for Wimps," *Journal of Portfolio Management*, Spring 1994.

According to the empirical version of the CAPM discussed earlier and in more detail in Appendix C, the cost of equity capital is given by the following expression:

$$K = R_F + 0.25\,(R_M - R_F) + 0.75\,\beta(R_M - R_F) \qquad (4)$$

Thus, according to the ECAPM, the risk premium is given by $0.25(R_M - R_F) + 0.75\beta(R_M - R_F)$. Inserting the same market risk premium of 6.7% for $(R_M - R_F)$, a beta of 0.67, as was done with the traditional CAPM, my ECAPM estimate of the appropriate HQ Distribution risk premium is 0.25 x 6.7% + 0.67 x 0.75 x 6.7%, or 5.0%.

III. 2. RISK PREMIUM: U.S. ENERGY DISTRIBUTION UTILITIES

In view of the extreme scarcity of publicly-traded utilities in Canada subject to the direct opinions of investors, and the total absence of pure-play electric distribution utilities in Canada, I have examined the historical risk premiums on securities issued by the U.S. electric utility and natural gas utility industries. The results of these analyses indicate that the risk premium is in the range of 5.7% - 6.1% as explained below. This corroborates the conservative nature of my 4.5% - 5.0% risk premium for HQ Distribution.

A historical risk premium for the electric utility industry was estimated with an annual time series analysis from 1931 to 2000 applied on the electric utility industry as a whole, using Moody's Electric Utility Index as an industry proxy. The analysis is depicted on Exhibit RAM-7. The risk premium was estimated by computing the actual return on equity capital for Moody's Index for each year from 1931 to 2000 using the actual stock prices and dividends of the index, and then subtracting the long-term government bond return for that year. The average risk premium over the period was 5.7% over long-term Treasury bonds. It should be emphasized that over most of this period electric utilities were regulated vertically-integrated monopolies like HQ Distribution.

In a similar manner, an historical risk premium was estimated with an annual time series analysis from 1955 to 2000 applied on the natural gas distribution industry as a whole, using Moody's Natural Gas Distribution Index as an industry proxy. Data for this particular index was unavailable prior to 1955. The analysis is depicted on Exhibit RAM-8. The risk premium was estimated by computing the actual return on equity capital for Moody's Index for each year from 1955 to 2000 using the actual stock prices and dividends of the index, and then subtracting the long-term government bond return for that year. The average risk premium over the period was 6.1% over long-term Treasury bonds.

III. 3. ALLOWED RISK PREMIUM

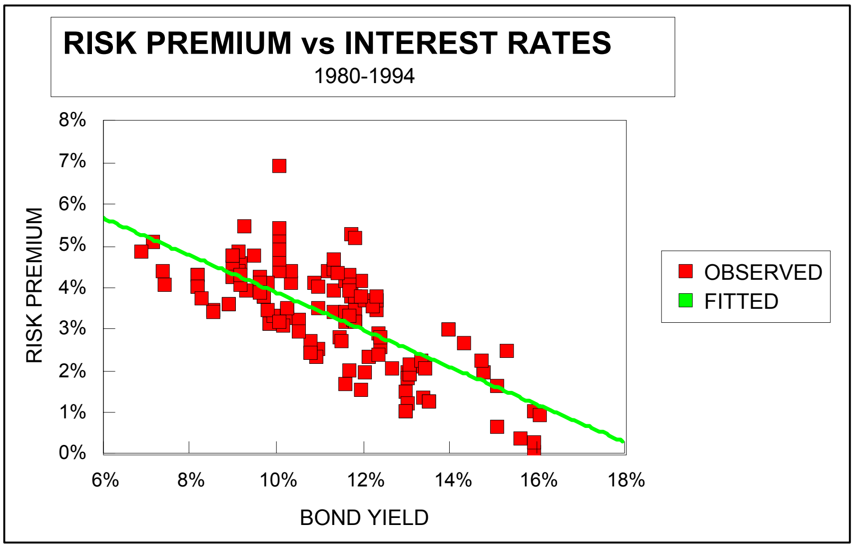
I examined the risk premiums allowed by Canadian regulators over the period 1980-1994 and their relationship with interest rates. My analysis terminated in 1994 because the National Energy Board adopted a mathematical formula after 1994, and several provincial regulators followed suit. During that time period, the allowed risk premium by Canadian regulators averaged about 4%.

A more careful review of these ROE decisions relative to interest rate trends reveals a narrowing of the risk premium in times of high and volatile interest rates, and a widening of the premium as interest rates fall. For the 1980-1994 period, the following statistical relationship prevailed between the risk premium (RP) allowed by Canadian regulators and the contemporaneous level of interest rates (YIELD):

$$RP = 0.084 - 0.45\ YIELD \qquad R^2 = 0.53$$

$$(t=-12.6)$$

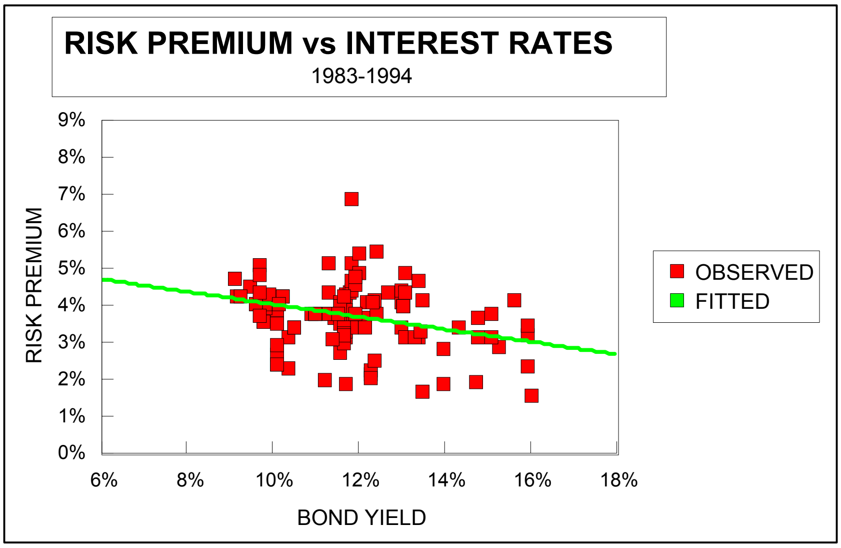
The accompanying graph shows the pattern observed for this large sample of 140 regulatory awards. The relationship is statistically very significant as indicated by the R^2 and t-value of the coefficient. The slope coefficient is negative and very close to one-half. This finding implied that for a 100 basis points change in government bond yields, the equity risk premium changes 45 basis points in the opposite direction for a net change of 55 basis points in ROE.



However, if one excludes the decisions from the early 1980s from the period of study, the relationship between the risk premium and interest rates remains negative but is far less sensitive. The accompanying graph shows the relationship over the 1983-1994 period, which excludes the hyperinflation of the early 1980s. For the 1983-1994 period, the following statistical relationship prevailed:

$$RP = 0.070 - 0.31\ YIELD \qquad R^2 = 0.25$$
$$(t = -6.0)$$

The relationship remains statistically highly significant as indicated by the R^2 and t-value of the coefficient, the slope coefficient remains negative but is much weaker at 0.30 versus the 0.50 obtained earlier. This result implies that for a 100 basis points change in interest rates, the equity risk premium changes 31 basis points in the opposite direction for a net change of 69 basis points in ROE.



Substituting the current long-term Canada bond rate of 6.0% as a proxy for the risk-free rate in the above relationship, a risk premium of 5.1% is obtained. The appropriate risk-free rate is discussed below.

$$RP = 0.070 - 0.31 \times .0600 = .051 = 5.1\%$$

If we limit the sample to natural gas transmission utilities on the grounds that they are conservative proxies for HQ Distribution, the relationship for the overall 1980-1994 period for the 31 natural gas transmission NEB decisions is:

$$RP = 0.085 - 0.49\ YIELD \qquad R^2 = 0.75$$

(t = -9.4)

When the hyperinflationary years of 1981-1982 are excluded, the relationship for the 24 NEB awards becomes:

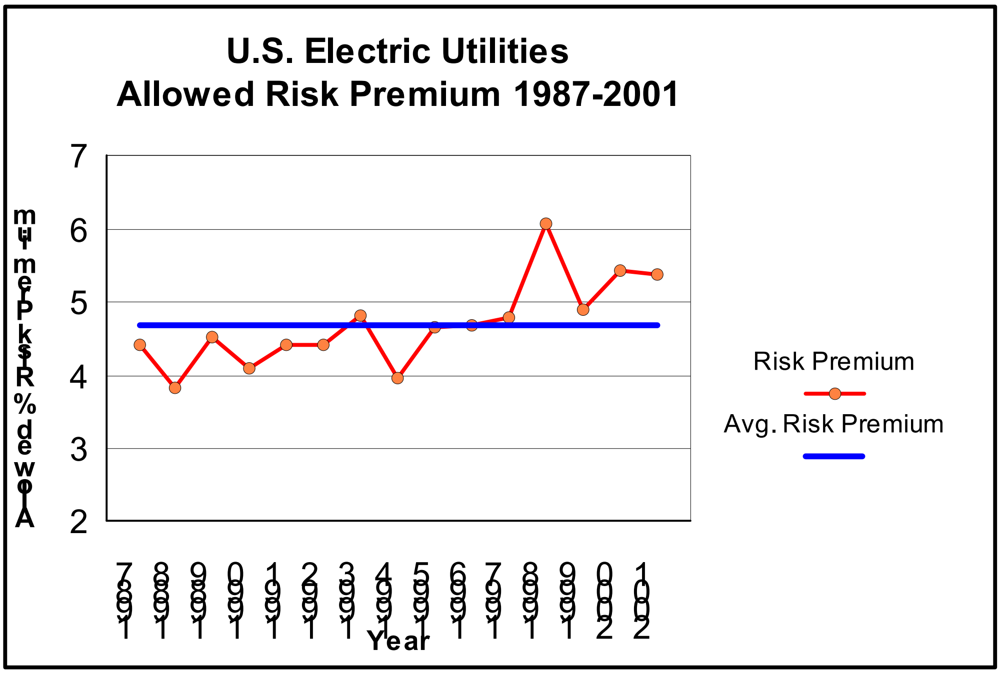
$$RP = 0.068 - 0.32\ YIELD \qquad R^2 = 0.45$$

(t = -4.2)

The results are very similar to those obtained earlier for the overall sample of regulatory decisions. Substituting a risk-free rate of 6.0% in the above relationship, a risk premium of 4.9% is obtained:

$$RP = 0.068 - 0.32 \times .0600 = .049 = 4.9\%$$

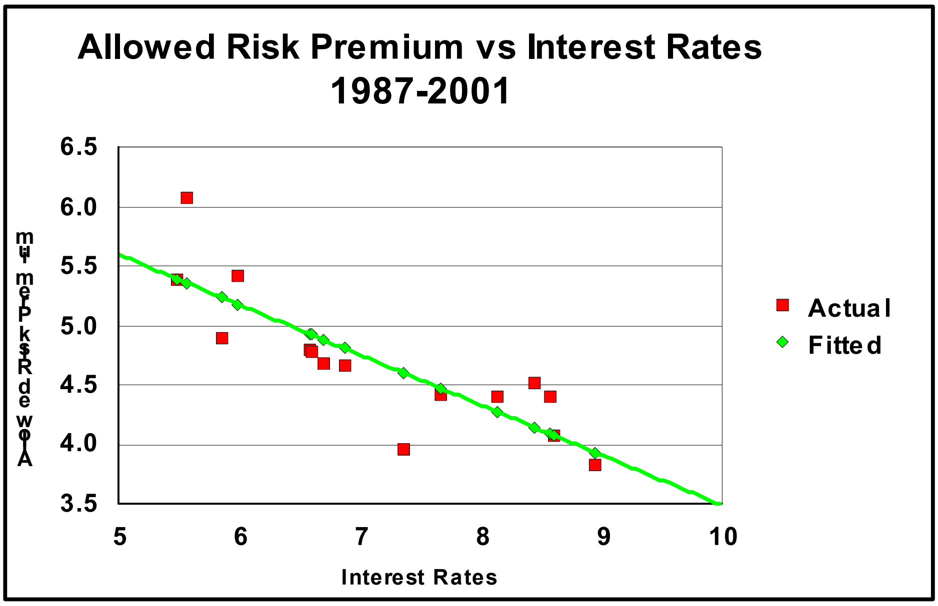
Risk premiums allowed by U.S. regulators behave in a similar fashion. I examined the historical risk premiums implied in the returns on equity ("ROE") allowed by regulatory commissions in over four hundred ROE decisions over the period 1987-2001 relative to the contemporaneous level of the long-term Treasury bond yield. The average ROE spread over long-term Treasury yields was 4.7% for the 1987-2001 period as shown by the horizontal line in the graph below. The graph also shows the year-by-year allowed risk premium. The rising trend of the risk premium in response to lower interest rates and rising competition and restructuring is noteworthy.



As was the case with the Canadian data, we note a narrowing of the risk premium in times of rising interest rates and a widening of the premium as interest rates fall. The following statistical relationship between the risk premium (RP) and interest rates (YIELD) emerges over the 1987-2001 period:

$$RP = 0.0771 - \underset{(t = 5.6)}{0.4216}\ YIELD \qquad R^2 = 0.70$$

The relationship is highly statistically significant as indicated by the high R^2 and statistically significant t-value of the slope coefficient. The figure below shows the inverse relationship between the allowed risk premium and interest rates as revealed in past ROE decisions.



Inserting the current long-term Treasury bond yield of 5.7% in the above equation suggests that an allowed risk premium of 5.3% for the average risk electric utility. A similar analysis of allowed risk premiums in the natural gas distribution utility industry produces nearly identical results.

Therefore, both Canadian and U.S. regulators have allowed risk premiums averaging 4.0% - 4.7% over time, with a midpoint of 4.4%. If we adjust for the level of interest rates prevailing at the time of those decisions, the interest-rate adjusted risk premiums lie in a range of 4.9% - 5.3% with a midpoint of 5.1%.

III. 4. RISK PREMIUM ESTIMATES: SUMMARY

The table below summarizes the risk premium results from the six risk premium studies.

STUDY	RISK PREMIUM
CAPM	4.5%
ECAPM	5.0%
Electric Utility Historical	5.7%
Natural Gas Utility Historical	6.1%
Allowed Risk Premium	4.4%
Allowed Risk Premium	5.1%

AVERAGE	5.1%

The average risk premium from the various methodologies is 5.1%. Based on all those risk premium results and placing less weight on the two estimates obtained from the historical risk premium analysis of the U. S. electric and natural gas distribution industries, a risk premium in the range of 4.5% - 5.0% is reasonable for HQ Distribution, albeit conservative.

III. 5. RISK-FREE RATE

To implement the Risk Premium and CAPM methods, an estimate of the risk-free return is required as a benchmark. As a proxy for the risk-free rate, I examined the actual level of long-term Canada (LTC) bond yields prevailing at the end of May 2002 and the consensus forecast of LTC bond yields. The current yield on long-term Canada bonds stood at approximately 6.0%. The April 2002 issue of Consensus Forecasts shows a LTC 10-year bond yield of 5.9% in three months and 6.1% in twelve months, or about the same yield on 30-year bonds, given the unusually very narrow spread of nearly zero between 30-year and 10-year bonds at this time.

Long-term yields are the relevant benchmarks when determining the cost of common equity, and not short-term interest rates. Short-term rates are volatile, fluctuate widely, and are subject to more random disturbances than are long-term rates. For example, Treasury bills are used by the Bank of Canada as a policy vehicle to stimulate the economy and to control the money supply, and are also used by foreign governments, firms, and individuals as a temporary safe-house for money. Short-term rates are largely administered rates.

As a practical matter, it is inappropriate to relate the return on common stock to the yield on short-term instruments. This is because short-term rates, such as the yield on 90-day Treasury Bills, fluctuate widely leading to volatile and unreliable equity return estimates. Moreover, yields on 90-day Treasury Bills typically do not match the equity investor's planning horizon. Equity investors generally have an investment horizon far in excess of 90 days or one year.

As a conceptual matter, short-term Treasury Bill yields reflect the impact of factors different from those influencing long-term securities such as common stock. The premium for expected inflation embedded into 90-day Treasury Bills is likely to be far different than the inflationary premium embedded into long-term securities yields. On grounds of stability and consistency, the yields on LTC bonds match more closely with common stock returns.

For purposes of defining a fair and reasonable ROE, I shall use a risk-free rate of 6.0%, which is consistent with the actual and the consensus forecast for long-term LTC bonds. Coupling the 6.0% risk-free rate with the 4.5% - 5.0% risk premium range produces an ROE in the range of 10.5% - 11.0%. It would not be unreasonable to utilize the midpoint of that range, namely, 10.75% for ratemaking purposes.

III.6 DCF CHECKS

As a check on my ROE recommendation, I applied the DCF model to a reasonable proxy for HQ Distribution: a group consisting of investment-grade U.S. combination gas & electric utility companies shown in Exhibit RAM-9. It is reasonable to postulate that the HQ Distribution possesses an investment risk profile similar to the activities of combination gas & electric utilities. These combination gas & electric companies possess economic characteristics similar to those of HQ Distribution. They are both involved in the distribution of energy services products at regulated rates in a cyclical and weather-sensitive market.

They both employ a capital-intensive network with similar physical characteristics. They are both subject to rate of return regulation.

I strongly believe that a DCF analysis of U.S. electric utilities provides valuable evidence to the Regie, and that such evidence be considered and given substantial weight for two reasons. First, there is only a small handful of undiversified pure-play electric utilities in Canada whose shares are publicly listed and actively traded, and are therefore subject to the opinions and actions of investors in a measurable way. In contrast, the U.S. energy utility industry is made up of some 100 investor-owned utilities with market data. Given this situation, the need to extend the very small sample of publicly-traded Canadian electric utilities to include other electric utilities of comparable risk is obvious. Second, analysts' long-term growth forecasts are widely available for U.S. electric utilities in contrast to Canadian markets where such forecasts are very sparse. It is therefore instructive not only to extend the sample of companies but also to examine the risk premium results for these companies based on the use of such forecasts, which are valid proxies for investors' growth expectations.

As explained in Appendix A, to apply the DCF model, two components are required: the expected dividend yield (D_1/P_o) and the expected long-term growth (g). The expected dividend D_1 in the annual DCF model can be obtained by multiplying the current indicated annual dividend rate by the growth factor (1 + g). In implementing the DCF model, I have used the spot dividend yields reported in the May 2002 edition of VLIS and the consensus long-term growth forecast of analysts reported in the Zacks Investment Research Web site.

As shown on Column 2 of Exhibit RAM-9, the average long-term growth forecast obtained from Zacks is 6.5% for this group. Adding this growth rate to the average expected dividend yield of 4.8% shown in Column 3 produces an estimate of equity costs of 11.3% for the group.

I also applied the same DCF analysis to a group of investment-grade U.S. natural gas distribution utilities shown in Exhibit RAM-10. It is reasonable to postulate that the HQ Distribution possesses an investment risk profile similar to that of natural gas distributors. As shown on Column 4 of Exhibit RAM-10, the average long-term growth forecast obtained from Zacks is 7.1% for this group. Adding this growth rate to the average expected dividend yield of 4.5% shown in Column 5 produces an estimate of equity costs of 11.6% for the group.

These DCF results in the 11.3% - 11.6% range attest to the conservative nature of my 10.5% - 11.0% ROE recommendation for HQ Distribution.

IV. CAPITAL STRUCTURE

My recommended return for HQ Distribution is predicated on a deemed capital structure consisting of 35% - 40% common equity capital.

In order to arrive at my recommendation, I have examined: 1) the common equity ratios imputed (deemed) by regulators for Canadian distribution utilities, 2) actual capital structures of Canadian distribution utilities, both investor-owned and government-owned, and 3) actual capital structures of U.S. energy distribution utilities.

As shown on Exhibit RAM-11, the average deemed common equity ratio for Canadian distribution utilities is 38.1%, versus Hydro-Québec's consolidated common equity ratio of about 27.7%. The average deemed common equity ratio for gas distributors and electricity distributors is 37.3% and 40.1%, respectively. I point out that the National Energy Board has just concluded a generic review of the appropriate equity ratio for Canadian natural gas transmission companies and concluded that an increase from 30% to 33% was warranted. To the extent that the energy distribution business is riskier than the energy transmission business as discussed earlier, it stands to reason that a higher equity ratio is applicable to HQ Distribution.

Exhibit RAM-12 compiles the actual debt ratios for Canadian gas and electricity distributors. The overall composite average debt ratio for Canadian energy distributors is 61.3% as of 2000 (equity ratio of 38.7%). For the gas distribution segment, the average debt ratio is 63.2% (equity ratio of 36.8%). For the electricity distribution segment, the average debt ratio is 56.5% (equity ratio of 43.5%).

Page 1 of Exhibit RAM-13 displays the actual equity ratios for a broader sample of Canadian gas and electric utilities, as seen by investors. These ratios include short-term debt as part of the capital structure. Inclusive of short-term debt, the overall composite average equity ratio is 36.7%, versus 27.7% for Hydro-Québec. The average actual common equity ratio for electric distributors and gas distributors is 38.1% and 35.1%, respectively. Page 2 of Exhibit RAM-13 replicates the same analysis, only this time excluding short-term debt from the computation of capital structure ratios. Exclusive of short-term debt, the overall composite average equity ratio is 39.7%, versus 27.7% for Hydro-Québec. The average actual common equity ratio for electric distributors and gas distributors is 40.7% and 38.5%, respectively.

On the U.S. side of the border, as shown on Exhibit RAM-14 Pages 1 and 2, the average actual common equity ratio is 42% for investor-owned gas distributors and 41% for combination gas and electric utilities.

The summary table below recapitulates the various benchmark equity ratios that I have examined. The average equity ratio from all the studies is 38.9%, 37.9% for gas distributors and 40.7% for electricity distributors. It is reasonable to conclude from all these results that a fair and reasonable common equity ratio for HQ Distribution lies in a range of 35% - 40%.

SUMMARY OF CAPITAL STRUCTURE RESULTS

STUDY	**% Equity Ratio**

Deemed Canadian distributors		**38.1**
gas distributors	37.3	
electric distributors	40.1	
Actual Canadian distributors		**38.7**
gas distributors	36.8	
electric distributors	43.5	
Actual Canadian utilities with st debt		**36.7**
gas distributors	35.1	
electric distributors	38.1	
Actual Canadian utilities w/o st debt		**39.7**
gas distributors	38.5	
electric distributors	40.7	
Actual Canadian distributors		**38.7**
gas distributors	36.8	
electric distributors	43.5	
U.S. Energy utilities		
gas distributors	42.0	**41.5**
electric gas & elec	41.0	
GRAND AVERAGE		**38.9**
gas distributors	37.9	
electric distributors	40.7	

I note that CBRS's published benchmarks for regulated electric utilities include a debt ratio in the range of 50% - 65% (that is, an equity ratio of 35% - 50%) for an A rating. I also note that Standard & Poor's, the new parent of Canadian Bond Rating Service, publishes benchmark for regulated electric utilities. For electric utilities with a business ranking of 3-4 as would likely be the case for HQ Distribution, the benchmarks include a debt ratio in the range of 48% - 53.0% (that is, an equity ratio of 47% - 52%) for an A rating.

In short, HQ Distribution's capital structure contains a smaller common equity capital base than Canadian publicly-owned electric utilities, and a substantially smaller common equity base than comparable investor-owned energy utilities. This in turn results in very low interest coverages. Based on the aforementioned comparisons and the need to maintain the company's current bond rating, I consider a common equity ratio in the range of 35% to 40% to be cost efficient and optimal. To the extent that HQ Distribution's total investment risks exceed the industry average, a common equity ratio in the upper half of the range would be reasonable for ratemaking purposes.

It is important to note that lower common equity ratios imply greater risk and higher capital cost[10]. If the Regie authorizes the bottom portion of my recommended equity ratio of 35%, it is important that the Regie also select the upper end of my recommended ROE range in order to reflect the higher risk associated with the riskier capital structure. The reverse is true as well. In other words, the recommended ROE must be matched with the capital structure recommendation.

V. SUMMARY

I was asked to recommend a fair and reasonable return on HQ Distribution's common equity capital under current capital market conditions and a fair and reasonable capital structure for ratemaking purposes. I found that a return on equity in the range of 10.5% - 11.0% and a deemed capital structure consisting of 35% - 40% common equity are fair and reasonable for ratemaking purposes.

To reach that conclusion, I applied various risk premium methodologies to publicly-traded companies which are reasonable surrogates for HQ Distribution's electricity distribution operations, including Canadian energy utilities, comparable U.S. electric utilities, and natural gas utilities. My examination revealed that an appropriate beta for HQ Distribution is 0.67, based on the comparative betas of

[10] It is a rudimentary tenet of basic finance that the greater the amount of financial risk borne by common shareholders, the greater the return required by shareholders in order to be compensated for the added financial risk imparted by the greater use of senior debt financing. In other words, the greater the debt ratio, the greater is the return required by equity investors. The cost of equity must be adjusted to reflect the additional risk associated with the more debt-heavy capital structure. The reverse is true as well.

the several proxy groups and the betasi implied in the ROE decisions of North American regulators. To translate the risk estimate into a risk premium estimate, I used the CAPM framework. Using the plain vanilla CAPM, the risk premium implied by HQ Distribution's beta of 0.67 and an overall market risk premium of 6.7% is 4.5%. Using the empirical version of the CAPM, the risk premium is 5.0%.

I also applied two historical risk premium analyses to electric utilities and natural gas utilities, and found risk premiums in the range of 5.7% - 6.1%. I also examined the risk premiums allowed by North American regulators in the past and found that North American regulators have allowed risk premiums averaging 4.0% - 4.7% over time, with a midpoint of 4.4%. The allowed risk premium is systematically and inversely related to the level of interest rates, however. Adjusting the risk premium for the level of present interest rates, the indicated risk premium is in the range of 4.9% - 5.3% with a midpoint of 5.1%.

The table below summarizes the results from the six risk premium studies.

STUDY	RISK PREMIUM
CAPM	4.5%
ECAPM	5.0%
Electric Utility Historical	5.7%
Natural Gas Utility Historical	6.1%
Allowed Risk Premium	4.4%
Allowed Risk Premium	5.1%

The average risk premium from the various methodologies is 5.1%. Based on all those risk premium results and placing less weight on the two estimates obtained from the historical risk premium analysis of the U. S. electric and natural gas distribution industries, a risk premium in the range of 4.5% - 5.0% was found reasonable for HQ Distribution, albeit conservative.

I then combined the risk premium range of 4.5% - 5.0% with a risk-free rate of 6.0% to arrive at a ROE in the range of 10.5% - 11.0%. The risk-free rate of 6.0% is consistent with both actual yields and with the consensus forecast for 30-year LTC bonds.

I have examined the capital structures used for ratemaking purposes and the actual capital structures of Canadian and U.S. gas and electricity distributors, both investor-owned and publicly-owned. I have also considered the company's need to preserve flexibility in accessing capital markets on favorable terms, especially during periods of tight credit and adversity and the need to maintain Hydro-Québec's current bond ratings. Maintenance of the current bond ratings is important in order to minimize the cost of debt capital and provide the company access to the debt markets during periods of instability in the capital markets on reasonable financial terms. Given the deemed and actual capital structures of Canadian and U.S. gas and electricity distribution utilities and the need to access the bond markets under favorable terms, I find that a deemed common equity ratio of in the range of 35% - 40% is appropriate for HQ Distribution at this time. If the Regie authorizes the lower (upper) portion of my recommended common equity ratio range of 35% - 40%, it is important that the Regie also select the upper (lower) end of my recommended ROE range in order to reflect the higher (lower) risk associated with the riskier (less risky) capital structure.

APPENDIX A

A REVIEW OF ROE METHODOLOGIES

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APPENDIX A
A REVIEW OF ROE METHODOLOGIES

I. Regulatory Framework and Rate Of Return

The rates set by a regulatory commission should be sufficient to cover the utility's operating costs, including taxes and depreciation, plus an adequate dollar return on the capital invested. The required return in dollars is obtained by multiplying the established rate of return set by the regulator by the "rate base". The rate base is essentially the net book value of the utility's plant considered used and useful in dispensing service.

The heart of utility regulation is the setting of just and reasonable rates by way of a fair and reasonable return. There are landmark Supreme Court cases in both Canada and the United States which define the legal principles underlying the regulation of a public utility's rate of return and provide the foundations for the notion of a fair return. These landmark cases provide the foundations for the notion of a fair and reasonable return. In essence, the return on equity allowed by the regulator should be: (1) commensurate with returns on investments in other firms having corresponding risks, (2) sufficient to assure confidence in the financial integrity of the company, and (3) maintains the company's creditworthiness and ability to attract capital on reasonable terms.

The aggregate return required by investors is called "cost of capital". The cost of capital is the opportunity cost, expressed in percentage terms, of the total pool of capital employed by the company. It is the composite weighted cost of the various classes of capital (bonds, preferred stock, common stock) used by the utility, with the weights reflecting the proportions of the total which each class of capital represents.

While utilities enjoy varying degrees of monopoly in the sale of public utility services, they must compete with everyone else in the free, open market for the input factors of production, whether it be labor, materials, machines, or capital.

The prices of these inputs are set in the competitive marketplace by supply and demand, and it is these input prices which are incorporated in the cost of service computation. This is just as true for capital as for any other factor of production.

The concept of a fair return is intimately related to the concept of opportunity costs. When investors supply funds to a utility by buying its stocks or bonds, not only are they postponing consumption, giving up the alternative of spending their dollars in some other way, but they are also exposing their funds to risk. Investors are willing to incur this double penalty only if they are adequately compensated. The compensation they require is the price of capital. If there are differences in the risk of the investments, competition among firms for a limited supply of capital will bring different prices. These differences in risk are translated into price differences by the capital markets in much the same way that commodities which differ in characteristics will trade at different prices.

The important point is that the prices of debt capital and equity capital are set by supply and demand, and both are influenced by the relationship between the risk and return expected for those securities and the risks expected from the overall menu of available securities.

A regulated utility's funds are obtained in two general forms, debt capital and equity capital. The cost of debt funds and preferred stock funds can be easily ascertained from an examination of the contractual interest payments and preferred dividends. The cost of common equity funds, that is, equity investors' required rate of return, is more difficult to estimate because the dividend payments received from common stock are not contractual or guaranteed in nature. They are uneven and risky, unlike interest payments. This appendix addresses the issue of a fair and reasonable return on the common equity capital. The return on common equity estimate can then be easily combined with the embedded costs of debt and preferred stock together with the company's capital structure, in order to arrive at the overall cost of capital.

There are four broad methodologies available to estimate the fair return on equity: DCF, Risk Premium, CAPM, and Comparable Earnings. No one individual method provides the necessary level of precision for determining a fair return, but each method provides useful evidence so as to facilitate the exercise of an informed judgment. Reliance on any single method or preset formula is inappropriate when dealing with investor expectations. Moreover, the advantage of using several different approaches is that the results of each one can be used to check the others.

II. Cost of Equity Capital: DCF Method

The value of any security to an investor is the expected discounted value of the future stream of dividends or other benefits. One widely used method to measure these anticipated benefits in the case of a non-static company is to examine the current dividend plus the increases in future dividend payments expected by investors. This valuation process can be represented by the following formula, which is the traditional DCF model:

$$K_e = D_1/P_o + g$$

where: K_e = investors' expected return on equity

D_1 = expected dividend during the coming year

P_o = current stock price

g = expected growth rate of future dividends

The traditional DCF formula states that under certain assumptions, which are described in the next paragraph, the equity investor's expected return, K_e, can be viewed as the sum of an expected dividend yield, D_1/P_o, plus the expected growth rate of future dividends and stock price, g. The principal appeal of the DCF approach is its simplicity and its correspondence with the intuitive notion of dividends plus capital appreciation as a measure of investors' expected return. The returns anticipated at a given market price are not directly observable and must be estimated from statistical market information. The idea of the market value approach is to infer 'K_e' from the observed share price and from an estimate of investors' expected future growth.

The economic basis for the DCF market value test is that new capital will be attracted to a firm only if the return expected by the suppliers of funds is commensurate with the return available from alternatives of comparable risk.

The assumptions underlying this valuation formulation are well known. The assumptions are discussed in detail in Chapter 5 of my book, _Regulatory Finance_. The traditional DCF model requires the following main assumptions: a constant average growth trend for both dividends and earnings, a stable dividend payout policy, a discount rate in excess of the expected growth rate, and a constant price-earnings multiple, which implies that growth in price is synonymous with growth in earnings and dividends. The traditional DCF model also assumes that dividends are paid annually when in fact dividend payments are normally made on a quarterly basis.

The measurement of the investor's required rate of return (K_e) can be broken down into two components: measurement of the expected dividend yield (D_1/P_o) and the measurement of growth (g). Three variables are therefore required for the DCF model:

1. Dividend payments for the next year, D_1
2. Estimated growth in future dividends, g and
3. The current stock price, P_o

The current stock price and the dividend payment for the coming year can easily be obtained from published market data. The expected dividend payment is simply the current dividend, D_0, multiplied by one year of growth: $D_1 = D_0(1+g)$

To obtain the growth term, growth estimates developed by professional analysts employed by large investment brokerage institutions and historical dividend growth information can be examined.

The DCF model is usually applied to both the utility's own data, if the company is publicly traded, and to groups of comparable risk utilities and industrial companies.

III. Cost of Equity: Risk Premium Method

The Risk Premium method of determining the cost of equity recognizes the fundamental principle that common equity capital is more risky than debt from an investor's standpoint, and that investors require higher returns on stocks than on bonds to compensate for the additional risk. The general approach is relatively straightforward. First, determine the historical spread between the return on debt and the return on equity. Second, this spread must be added to the current debt yield to derive an estimate of current equity return requirements.

One advantage of the risk premium approach over the DCF approach is that the former is a month-by-month study of the cost of equity over the cost of debt, in contrast to the latter which is a point-in-time cross-sectional estimate. In other words, the risk premium approach takes a time-series perspective rather than a snapshot point-in-time view, and is therefore less vulnerable to the vagaries of any one particular capital market environment at a given point in time.

The magnitude of the relative risk premiums is determined by shifts in demand and supply in each capital market segment, which are in turn driven by investors' attitudes towards risk, and by the relative risk differentials perceived by investors between each type of security.

The risk premium approach to estimating the cost of equity derives its merits and its usefulness from the simple fact that while equity returns cannot be readily quantified at a given point in time, the returns on bonds can be assessed on a regular basis. If the magnitude of the risk premium between stocks and bonds is known, then this information can be utilized to determine the cost of common equity.

There are two broad approaches used to estimate the risk premium, one historical and the other prospective. The historical approach examines the historical returns actually earned from investments in common equities and bonds. One danger with such a procedure involves the distinction between expected and realized return. The historical risk premium approach fundamentally assumes that average realized return is an appropriate surrogate for expected return, or in other words that investor expectations are realized. Realized returns can be substantially different from prospective returns anticipated by investors especially over short time periods, and therefore constitute a hazardous benchmark on which to base the risk premium between stocks and bonds. To minimize this difficulty, a very long time period should be selected.

The prospective approach rests on investor expectations, and risk premiums are based on expected returns rather than on realized returns. The usual way to perform a prospective risk premium analysis is to apply the DCF model to a broad utility index each month or each year over a long time period. The risk premium can be obtained by computing the cost of equity capital for each month using the DCF model, and then subtracting the yield on risk-free securities for that month. The risk premiums for each sub-period are averaged to arrive at the overall risk premium for the overall period.

IV. Cost of Equity: CAPM Method

The CAPM is a fundamental paradigm of finance and widely recognized. Professor William Sharpe, the main architect of the CAPM, was awarded the 1990 Economics Nobel prize for his pioneering work on the CAPM.

The fundamental idea underlying the CAPM is that risk-averse investors demand higher returns for assuming additional risk, and higher-risk securities are priced to yield higher expected returns than lower-risk securities. The CAPM quantifies the additional return, or risk premium, required for bearing incremental risk, and provides a formal risk-return relationship anchored on the basic idea that only market risk matters, as measured by beta. According to the CAPM, securities are priced such that:

EXPECTED RETURN = RISK-FREE RATE + RISK PREMIUM

Denoting the risk-free rate by "R_F" and the return on the market as a whole by "R_M", the CAPM is stated as follows:

$$\mathbf{K = R_F + \beta(R_M - R_F)}$$

The beta coefficient occupies a central role in financial theory, and has been shown to be a sufficient and complete measure of risk for diversified investors. The beta measure aims at assessing the volatility of a security's return relative to that of the market. The beta coefficient compares the volatility and direction of movement of the return on investment with those of the market as a whole. Specifically, the beta coefficient of a particular stock measures the degree to which the return on the stock follows the trend of the market. It indicates that change in the rate of return on a stock associated with a one percentage point change in the rate of return on the market. For example, a beta of 0.75 would indicate that a company is 75% as volatile as the overall capital market. If the market rises 10%, the stock will rise 7.5%, and conversely. The beta coefficient thus measures the degree to which that stock shares the same risk as the market as a whole. For diversified investors, it is the only relevant risk measure.

To apply the CAPM, we need three quantities: the risk-free rate, beta, and the market risk premium. As a proxy for the risk-free rate, the current yield on long-term government bonds can be used. Beta estimates are widely available from investment information sources, such as Value Line and Standard & Poors. An estimate of the market risk premium can be obtained either from studies of historical stock and bond returns over long time periods or from prospective estimates. In the latter case, a simple annual DCF analysis applied to the market as a whole is performed to obtain the aggregate return on equity, and then the risk-free rate is subtracted from that estimate to arrive at the market risk premium.

The empirical version of the CAPM, known as the Empirical CAPM, is discussed in Appendix C.

V. Cost of Equity: Comparable Earnings Approach

The Comparable Earnings standard uses the return earned on book equity investment by enterprises of comparable risks as the measure of fair return. The approach rests on a particular notion of opportunity cost, namely that a utility should be allowed to earn what it would have earned had its capital been invested in other firms of comparable risk. A goal of fairness is said to be achieved by this. Thus, if regulation attempts to duplicate competitive results, the rate of return permitted on a utility's common equity capital should be of the same general order of magnitude as that of a group of unregulated industrials with the same risk characteristics.

The rationale of the method is that regulation is a duplicate for competition. The profitability of unregulated firms is set by the free forces of competition. In the long run, the free entry of competitors would limit the profits earned by these unregulated companies, and, unprofitable ventures and product lines would be abandoned by the unregulated companies. Aggregating book rates of return over a large number of unregulated companies would even out any abnormal short run profit aberrations, while averaging over time would dampen any cyclical aberrations. Thus, by averaging the book profitability of a large number of unregulated companies, an appropriate measure of the fair return on equity for a public utility is obtained.

The Comparable Earnings approach makes use of simple readily available accounting data; return on book equity data is widely available on computerized data bases for most public companies and for a wide variety of market indices. The method is easily understood, and is firmly anchored in regulatory tradition. The method is not influenced by the regulatory process to the same extent as market-based methods such as DCF and CAPM. The base to which the

Comparable Earnings standard is applicable is the utility's book common equity, which is much less vulnerable to regulatory influences than stock price which is the base to which the market-based standards are applied. Stock price can be influenced by the actions of regulators.

To implement the method, the historical ROEs for a group of unregulated comparable risk companies are estimated over a full business cycle. In examining the returns achieved by regulated companies there is a clear danger of circularity of analysis. That is, the earnings of other regulated utilities are also subject to regulation and tests of fairness and appropriateness. It is therefore preferable to go beyond the bounds of regulated utilities when comparisons are made of returns to book value.

To implement the method, a group of comparable risk unregulated companies is identified, using standard measures of risk, such as beta, bond rating, and volatility of returns. If regulation is attempting to duplicate competitive results, which I think it should, the rate of return permitted on a utility's common equity capital should be of the same general order of magnitude as on nonregulated companies with corresponding risk characteristics.

One practical difficulty with the method is that the historical returns on industrials have been decimated by corporate restructurings in recent years and are therefore downward-biased estimates of the corporate sector's future earnings. Another difficulty is to identify a set of low-risk industrials with the same investment risk characteristics as regulated utilities. Finally, historical returns on book equity are not necessarily equal to market-based rates of return, based on stock prices.

APPENDIX B
RESERVATIONS ON THE DCF MODEL

I have several reservations concerning the application of the DCF method. My reservations concern: 1) the impact of declining earnings per share and slow growth in dividends per share which have distorted historical data and near-term projected data for several utilities, which in turn renders the application of the DCF model problematic, 2) the realism of the model's underlying assumptions and applicability to utility stocks in general in the current capital market environment, and 3) the estimation of the expected growth component required by the DCF model.

1. DECLINING GROWTH RATES

Under normal circumstances, the DCF required return on common equity is estimated directly from the company's own corporate and market data, or that of its parent as proxy. The return on equity is obtained by combining the appropriate dividend yield with the corresponding dividend growth rate expected by investors. Three procedures can be employed to estimate the growth in dividends expected by investors:

(1) historical growth of dividends/earnings per share;

(2) security analysts' growth expectations;

(3) sustainable growth method, with growth as the product of the expected retention ratio and the expected return on equity.

Historical growth rates can be downward-biased by the impact of diversification and restructuring activities in recent years and by the impact of abnormal weather patterns. Acquisitions, startup expenses and front-end capital investments associated with diversification and restructuring efforts, and unfavorable weather patterns in past years have retarded and diluted historical earnings growth for several utilities, and such growth is not representative of the company's long-term growth potential. Therefore, caution must be exercised when applying any of the growth estimating techniques directly to recent historical utility company data. More fundamentally, the basic assumptions of constant growth, constant ROE, and constant measures of financial performance which underlie the DCF model may be violated in the case of utility company data.

Moreover, the stock price used as input in the dividend yield component may be biased by structural changes and changing investor expectations in the utility industry. Stock prices can also be influenced by mergers and acquisitions possibilities, by speculation concerning asset restructurings and deregulation of certain assets, and by corporate takeover rumors.

2. REALISM OF ASSUMPTIONS

The traditional DCF model is based on a number of assumptions, some of which are unrealistic, particularly in the current capital market environment. For example, the standard DCF model assumes a constant market valuation multiple, that is, a constant price-earnings (P/E) ratio. That is, the model assumes that investors expect the ratio of market price to dividends (or earnings) in any given year to be the same as the current price/dividend (or earnings) ratio. This must be true if the infinite growth assumption is made. This is somewhat unrealistic under current conditions. The DCF model is not equipped to deal with sudden surges in market-to-book (M/B) and P/E ratios, as was experienced by several utility stocks, in recent years. Such ratios for the electric utility industry have behaved very erratically over the last ten years.

The equity market's behavior in the last decade does not comport well with the assumptions of the basic standard DCF model frequently employed by expert witnesses. Several fundamental and structural changes have transformed the utility industry from the times when the standard DCF model and its assumptions were developed. Increased competition triggered by national policy, accounting rule changes, changes in capital recovery rates, changes in customer attitudes regarding utility services, the evolution of alternative energy sources, deregulation, and mergers-acquisitions have all influenced stock prices in ways vastly different from the early assumptions of the DCF model. These changes suggest that some of the raw assumptions underlying the standard DCF model are questionable.

Contrary to the standard DCF assumption of a constant P/E ratio, stock price may not necessarily be expected to grow at the same rate as earnings and dividends by investors. This is especially true in the short run. Investors may very well assume that the price/earnings ratio will in fact continue to increase in the short run, fueling the expected rate of return. The converse is also true. P/E ratios have proved volatile and unstable in recent years. The essential point is that the constancy of the price/earnings ratio required in the standard DCF model may not always be a valid assumption. To the extent that increases (decreases) in relative market valuation are anticipated by investors, especially myopic investors with short-term investment horizons, the standard DCF model will understate (overstate) the cost of equity.

Another way of stating the same point is that the DCF model does not account for the ebb and flow of investor sentiments over the course of the business cycle. The problem is particularly acute in the current capital market environment where investors, faced with very low returns on short-term fixed-income securities and an uncertain market outlook, seek the higher yields offered by utility stocks (a flight to quality), boosting their stock price and lowering their dividend yield.

The following example illustrates the effect of erratic market valuation multiples on the DCF model. Assume that a stock is trading at $100. Assume further that its earnings per share are expected to be $8.00 for the current year, and are expected to grow at 10% per year in the future. Finally, assume that the Company pays out one-half of its earnings as dividends. If the stock is initially trading at 12.5 times earnings, the dividend yield is 4%. If investors do not expect the price/earnings ratio of 12.5 to change in the next year, the estimated expected return from holding the stock for one year using the standard DCF model is as follows: a dividend yield of 4%, plus growth in value (stock price) from $100 to

$110, or 10%, for a total return of 14%. The ending stock price is $110, that is, 12.5 times next year's earnings of $8.80.

But what if investors expect an increase in the price/earnings ratio from 12.5 to say 13.0? Then, the growth in value is from $100 to $114.4, or 13.0 times next year's earnings of $8.80, for a total return of 18.40% (dividend yield of 4%, plus growth in value of 14.40%). The orthodox DCF model would indicate returns of 14%, whereas the investors' true expected return is 18.4%. Investor expected returns are substantially understated whenever investors anticipate increases in relative market valuation, and conversely.

A convincing reason for caution and skepticism is that application of the DCF model produces estimates of common equity cost that are consistent with investors' expected return only when stock price and book value are reasonably similar, that is, when the M/B is close to unity. As shown below, application of the standard DCF model to utility stocks understates the investor's expected return when the market-to-book ratio of a given stock exceeds unity. This is particularly relevant in the current capital market environment where utility stocks are trading at M/B ratios well above unity. The converse is also true, that is, the DCF model overstates the investor's return when the stock's market-to-book ratio is less than unity. The reason for the distortion is that the DCF market return is applied to a book value rate base by the regulator, that is, a utility's earnings are limited to earnings on a book value rate base.

The simple numerical illustration shown in the table below demonstrates the result of applying a market value cost rate to book value rate base under three different M/B scenarios. The three columns correspond to three M/B situations: the stock trades below, equal to, and above book value, respectively. The last situation is noteworthy and representative of the current capital market environment. The DCF cost rate of 10%, made up of a 5% dividend yield and a 5% growth rate, is applied to the book value rate base of $50 to produce $5.00 of earnings. Of the $5.00 of earnings, the full $5.00 are required for dividends to produce a dividend yield of 5% on a stock price of $100.00, and no dollars are available for growth. The investor's return is therefore only 5% versus his required return of 10%. A DCF cost rate of 10%, which implies $10.00 of earnings, translates to only $5.00 of earnings on book value, a 5% return. The situation is reversed in the first column when the stock trades below book value. The $5.00 of earnings are more than enough to satisfy the investor's dividend requirements of $1.25, leaving $3.75 for growth, for a total return of 20%. This is because the DCF cost rate is applied to a book value rate base well above the market price. Therefore, the DCF cost rate understates the investor's required return when stock prices are well above book, as is the case presently.

EFFECT OF MARKET-TO-BOOK RATIO ON MARKET RETURN

		Situation 1	Situation 2	Situation 3
1	Initial purchase price	$25.00	$50.00	$100.00
2	Initial book value	$50.00	$50.00	$50.00
3	**Initial M/B**	**0.50**	**1.00**	**2.00**
4	**DCF Return 10% = 5% + 5%**	**10.00%**	**10.00%**	**10.00%**
5	Dollar Return	$5.00	$5.00	$5.00
6	Dollar Dividends 5% Yield	$1.25	$2.50	$5.00
7	Dollar Growth 5% Growth	$3.75	$2.50	$0.00
8	**Market Return**	**20.00%**	**10.00%**	**5.00%**

3. GROWTH RATE ESTIMATION

My last concern with the DCF model deals with the realism of the constant growth rate assumption and with difficulty of finding an adequate proxy for that growth rate. The standard DCF model assumes that a single growth rate of dividends is applicable in perpetuity. Not only is the constant growth rate assumption somewhat unrealistic, but it is difficult to proxy. Analysts' growth forecasts are usually made for not more than two to five years in time, or if they are made for more than a few years, they are dominated by the near-term earnings and dividends picture. In short, the perpetual growth term of the DCF model does not square well with the shorter-term focus of institutional investors.

Also, there is an element of logical circularity inherent in the growth component of the DCF model. The cost of equity capital depends on investors' growth expectations, which in turn depends partially on investors' perception of the regulatory process. The net result is that the cost of equity depends in part on anticipated regulatory action, since both components of the cost of equity, dividend yield and growth, are influenced by the regulatory process. Carried to its extreme, this implies that regulation would in effect deliver whatever equity return investors expect.

In summary, extreme caution and judgment are required in interpreting the results of the DCF model for because of (1) the effect of declining earnings and dividends on financial inputs to the DCF model and biases caused by the effect of changes in risk and growth on utilities, (2) the questionable applicability of the DCF model to utility stocks in general in the current capital market environment, and (3) the conceptual and practical difficulties associated with the growth component of the DCF model. Hence, there is a clear need to go beyond the DCF results and examine the results produced by alternate methodologies.

The DCF method is frequently applied to measure the prospective risk premium during a given time period in conjunction with the Risk Premium approach. The risk premium test relies on a succession of DCF observations over long periods, and is not as vulnerable to a given capital market environment as a spot DCF test. This is because the risk premium approach is a period-by-period study of the cost of equity over the cost of debt, in contrast to the DCF, which is a point-in-time cross-sectional estimate. In other words, the risk premium approach takes a broader time-series perspective rather than a snapshot point-in-time viewpoint, and is therefore less vulnerable to the vagaries of any one particular capital market environment.

Application of the DCF model to a broad aggregate of companies also mitigates the measurement difficulties outlined here. The vagaries of individual company results largely offset one another.

APPENDIX C

BETAS, CAPM, AND THE EMPIRICAL CAPM

The traditional version of the CAPM is given by the following:

$$K = R_F + \beta(R_M - R_F)$$

There are two distinct separate issues involved when implementing the CAPM. First, what is the best proxy for expected beta, regardless of whether one subscribes to the CAPM or not? Second, and more fundamentally, does the standard form of the CAPM provide the best explanation of the risk-return relationship observed on capital markets? This appendix provides answers to these two fundamental questions.

1) Beta measurement

The literature on the use of adjusted betas is profuse. Numerous studies have considered the question of beta measurement and generally reached similar conclusions. The betas tended to regress toward the mean; high-beta portfolios tended to decline over time toward unity, while low-beta portfolios tended to increase over time toward unity. True betas not only vary over time but have a tendency to move back toward average levels.

Statistically, betas are estimated with error. Therefore, high estimated betas will tend to have positive error (overestimated) and low estimated betas will tend to have negative error (underestimated). Therefore, it is necessary to squash the estimated betas in towards 1.00. One way to do this is by the use of adjusted betas, which is commonly performed by investment services such as Value Line and Merrill Lynch.

For a thorough discussion of the method used for estimating Merrill Lynch betas, see Security Risk Evaluation Service, Merrill Lynch, New York, June 1984. Blume ("On the Assessment of Risk", Journal of Finance, March 1971) examined the stability of beta for all common stocks listed on the NYSE, and found a tendency for a regression of the betas toward 1.00. Blume demonstrated that the

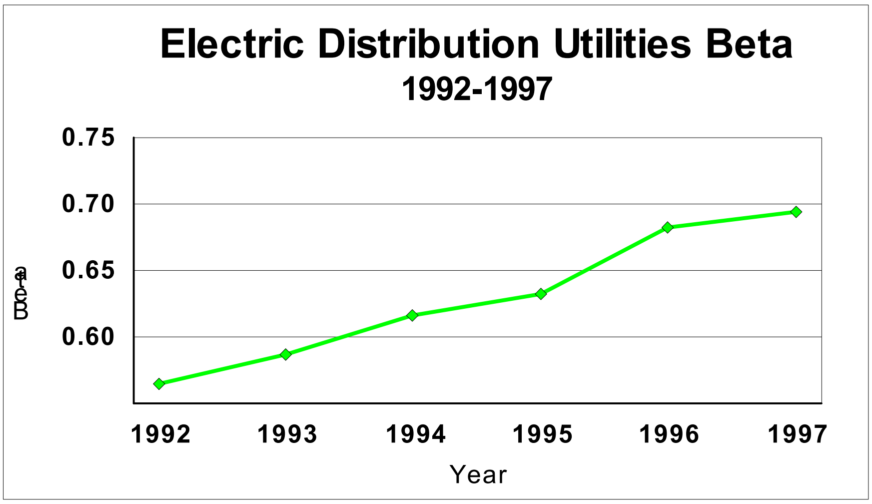
Value Line adjustment procedure anticipates differences between past and future betas. Chen ("Beta Non-Stationarity, Portfolio Residual Risk, and Diversification", Journal of Financial and Quantitative Analysis, March 1981) also analyzed the variability of beta and suggested employing the Bayesian adjustment approach employed by beta producers to estimate time-varying betas. A comprehensive study of beta measurement methodology by Kryzanowski and Jalilvand "Statistical Tests of the Accuracy of Alternative Forecasts: Some Results for U.S. Utility Betas," The Financial Review, Fall 1983, concludes that raw unadjusted beta (OLS beta) is one of the poorest beta predictors, and is outperformed by the Merrill Lynch-style Bayesian beta approach. Gombola & Kahl (1990) examined the time-series properties of utility betas and found strong support for the application of adjustment procedures such as the Value Line - Merrill Lynch procedures.

Well-known college-level finance textbooks routinely discuss the use of adjusted betas. Adjusted betas are routinely provided by investment services such as Value Line, the most widely circulated source of investment information to investors, Merrill Lynch, and Bloomberg. In accordance with this approach and with the empirical literature which strongly supports this procedure, the same beta adjustment procedures are in order. Commercial betas computed by various investment services give 2/3 weight to the measured raw beta and 1/3 weight to the prior value of 1.0 for each stock. This widely-used formula essentially pushes high betas down toward 1.0 and low betas up toward 1.0.

Some have argued that the empirical studies supporting the use of adjusted betas were not performed exclusively on utility stocks and, therefore, inapplicable to utility companies. For example, the aforementioned study by Gombola & Kahl showed by analysing individual stocks that there is a tendency of betas to regress towards their mean value. By confining their analysis to utility stocks, the Gombola & Kahl results suggest a regression tendency for betas to regress toward their grand utility mean and not toward the grand average of 1.0.

The difficulty with this argument is that the risks of electric utility stocks have escalated substantially after the period of study used in these studies because of restructuring, deregulation, and rising competition and, therefore, the true electric utility betas have escalated toward 1.0.

To verify this hypothesis, I examined the beta risk measure of a sample of distribution electric utilities over the 1992-1997 period. The beta trend is shown in the graph below. The inescapable trend from the graph is the ascent in the Value Line beta, rising steadily from 0.55 to 0.70. The rise in raw beta instead of adjusted beta would be even more dramatic. It is therefore highly improbable that electric utility betas have regressed to some steady-state industry average in light of the profound transformation that occurred in the electric utility's risk in the last decade.



To conclude, historical betas, whether raw or adjusted, are only surrogates for expected beta. The best of the two surrogates is clearly adjusted beta.

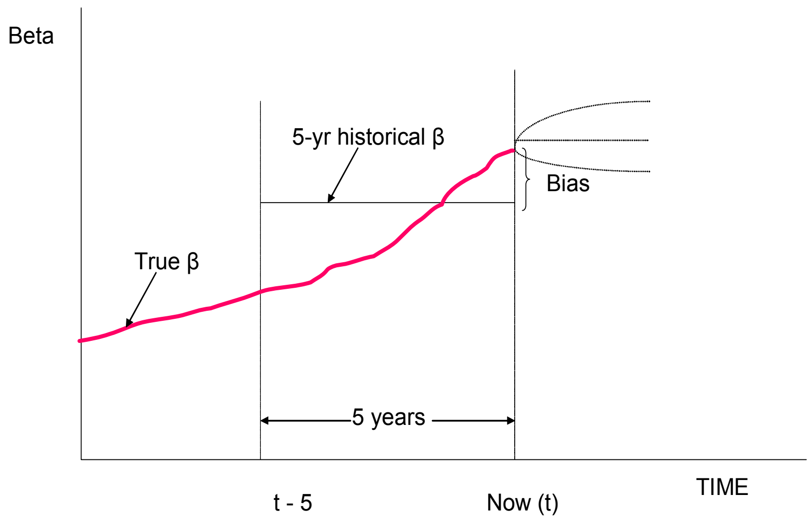
Bias in Historical Beta

The historical betas of electric utilities are downward-biased at this time because ongoing changes in risk fundamentals are not yet fully reflected in historical beta estimates. The historical betas reported by Value Line for the electric utility industry are not indicative of future trends in the industry. The true beta of a security can never be observed. Historically-estimated betas serve only as proxies for the true beta. The future may well differ from the past.

By construction, backward-looking betas are sluggish in detecting fundamental changes in a company's risk. For example, if an electric utility suddenly experiences a quantum increase in its business risk, as is the case under the stimulus of ongoing restructuring and competition, one expects an increase in beta. However, if 60 months of return data are used to estimate beta, only one of the 60 data points reflects the new information, one month after the company experiences its increase in business risk. Thus, the change in risk only has a minor effect on the historical beta. Even one year later, only 12 of the 60 return points reflect the event.

This situation is shown graphically in the figure below where the true underlying beta of an electric utility is gradually increasing because of recently added risk factors, such as increasing levels of competition and deregulation. Yet, the historical beta measured over a 5-year estimation period lies midway between the true beginning-of-period beta and the current end-of-period beta, seriously underestimating the current beta.

Bias in Estimating Beta From Historical Data



This type of bias certainly applies to electric utilities at this time. The downward bias in the historical betas of the electric utility industry is applicable to both raw and adjusted betas because both raw and adjusted betas are estimated with historical data extending back five years. The fundamental risks of electric utilities are changing rapidly. A beta truly reflective of market conditions is likely to be higher than that implied by a simple comparison of historical risk measures. Given the dramatic changes occurring in the electric utility operating environment, the need to be forward-looking is apparent.

2) Standard CAPM

A myriad empirical tests of the CAPM have shown that the risk-return tradeoff is not as steeply sloped as that predicted by the CAPM. That is, low-beta securities earn returns somewhat higher than the CAPM would predict, and high-beta securities earn less than predicted. This is one of the most widely known empirical findings of the finance literature. This extensive literature is summarized in Chapter 13 of Dr. Morin’s book [Regulatory Finance, Public Utilities Report Inc., Arlington, VA, 1994].

Several finance scholars have developed refined and expanded versions of the standard CAPM. These enhanced CAPMs typically produce a risk-return relationship that is flatter than the plain vanilla CAPM prediction. This is exactly what the empirical CAPM accomplishes. It produces a risk-return tradeoff that is flatter than the risk-return tradeoff predicted by the standard CAPM, and better approximates the observed relationship between risk and return in capital markets.

The statistical evidence indicates that the risk-return relationship is flatter than that predicted by the CAPM. For example, over the period 1926-1984, the empirical evidence cited in Morin, R. A., Regulatory Finance, Public Utility Reports Inc., Arlington, VA, 1994, indicates that the expected return on a security is actually given by the following equation:

$$\text{RETURN} = .0829 + .0520\,\beta$$

Given that the risk-free rate over the estimation period was approximately 6%, this relationship implies that the intercept of the risk-return relationship is higher than the 6% risk-free rate, contrary to the CAPM's prediction. Given the seminal Ibbotson-Sinquefield result that the average return on an average risk stock exceeds the risk-free rate by about 8.0% in that period, that is, $(R_M - R_F)$ = 8%, the intercept of the observed relationship between return and beta exceeds the risk-free rate by about 2%, or 1/4 of 8%, and the slope of the relationship, .0520, is close to 3/4 of 8%. Therefore, the empirical evidence suggests that the expected return on a security is related to its risk by the following approximation:

$$K = R_F + x\,(R_M - R_F) + (1\text{-}x)\,\beta(R_M - R_F)$$

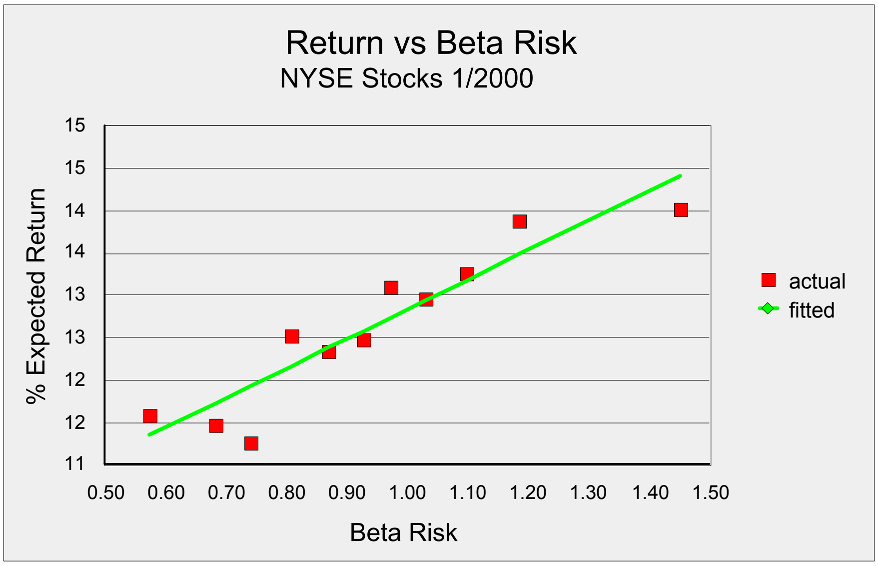
where x is a fraction to be determined empirically. The value of x was actually derived by systematically varying the constant "x" in that equation from 0 to 1 in steps of 0.05 and choosing that value of 'x' that minimized the mean square error between the observed relationship,

$$RETURN = .0829 + .0520\ \beta$$

and the empirical shortcut CAPM formula. The value of x that best explained the observed relationship was between 0.25 and 0.30. If x = 0.25 in the interest of conservatism, the equation becomes:

$$K = R_F + 0.25\ (R_M - R_F) + 0.75\ \beta\ (R_M - R_F)$$

Most of the empirical studies cited thus far utilize raw betas rather than Value Line adjusted betas because the latter were not available over most of the time periods covered in these studies. However, another empirical investigation of the relationship between return and Value Line adjusted betas was concluded in 2000 by Dr. Morin, and found a statistical relationship that is quite consistent with the general findings of the literature and with the earlier study. The graph below shows the observed relationship between DCF returns and Value Line adjusted betas that is much flatter than that predicted by the plain vanilla CAPM.

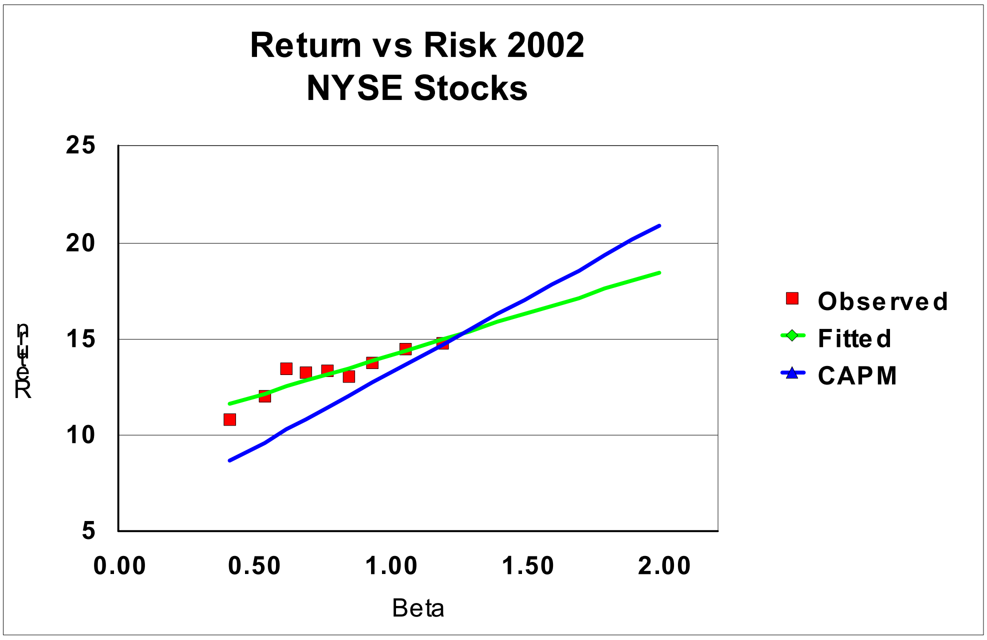


A study of the relationship between return and adjusted beta is reported on Table 6-7 in Ibbotson Associates Valuation Yearbook 2001. If we exclude the portfolio of very small cap stocks from the relationship due to significant size effects, the relationship between the arithmetic mean return and beta for the remaining portfolios is flatter than predicted and the intercept slightly higher than predicted by the CAPM. It is noteworthy that the Ibbotson study relies on adjusted betas as stated on page 95 of the aforementioned study.

Yet another study was recently concluded by Dr. Morin in May 2002 in support of the empirical validity of the CAPM. All the stocks covered in the Value Line Investment Survey for Windows for which betas and returns data were available were retained for analysis. There were nearly 2000 such stocks. The expected return was measured as the total shareholder return ("TSR") reported by Value Line over the past ten years. The Value Line adjusted beta was also retrieved from the same data base. The nearly 2000 companies for which all data were available were ranked in ascending order of beta, from lowest to highest. In order to palliate measurement error, the nearly 2000 securities were grouped into ten portfolios of approximately 180 securities for each portfolio. The average returns and betas for each portfolio were as follows:

Portfolio #	**Beta**	**Return**
portfolio 1	0.41	10.87
portfolio 2	0.54	12.02
portfolio 3	0.62	13.50
portfolio 4	0.69	13.30
portfolio 5	0.77	13.39
portfolio 6	0.85	13.07
portfolio 7	0.94	13.75
portfolio 8	1.06	14.53
portfolio 9	1.19	14.78
portfolio 10	1.48	20.78

It is clear from the graph below that the observed relationship between DCF returns and Value Line adjusted betas is much flatter than that predicted by the plain vanilla CAPM. The observed intercept is higher than the prevailing risk-free rate of 5.7% while the slope is less than equal to the market risk premium of 7.7% predicted by the plain vanilla CAPM for that period.



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(Spring 2002)

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HONORS: Professor of Finance for Regulated Industry & Director
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EDUCATIONAL HISTORY

- Bachelor of Electrical Engineering, McGill University, Montreal, Canada, 1967.

- Master of Business Administration, McGill University, Montreal, Canada, 1969.

- PhD in Finance & Econometrics, Wharton School of Finance, University of Pennsylvania, 1976.

EMPLOYMENT HISTORY

- Lecturer, Wharton School of Finance, Univ. of Pa., 1972-3
- Assistant Professor, University of Montreal School of Business, 1973-1976.
- Associate Professor, University of Montreal School of Business, 1976-1979.
- Professor of Finance, Georgia State University, 1979-2002
    - Professor of Finance for Regulated Industry and Director, Center for the Study of Regulated Industry, College of Business, Georgia State University, 1985-2002
- Visiting Professor of Finance, Amos Tuck School of Business, Dartmouth College, Hanover, N.H., 1986

OTHER BUSINESS ASSOCIATIONS

- Communications Engineer, Bell Canada, 1962-1967.
- Member of the Board of Directors, Financial Research Institute of Canada, 1974-1980.
- Co-founder and Director Canadian Finance Research Foundation, 1977.
- Vice-President of Research, Garmaise-Thomson & Associates, Investment Management Consultants, 1980-1981.
- Executive Visions Inc., Board of Directors, Member
- Board of External Advisors, College of Business, Georgia State University, Member 1987-1991

PROFESSIONAL CLIENTS

AT & T Communications

Alagasco - Energen

Alaska Anchorage Municipal Light & Power

Alberta Power Ltd.

Ameren

American Water Works Company

Ameritech

Baltimore Gas & Electric

B.C. Telephone

B C GAS

Bell Canada

Bellcore

Bell South Corp.

Bruncor (New Brunswick Telephone)

Burlington-Northern

C & S Bank

Cajun Electric

Canadian Radio-Television & Telecomm. Commission

Canadian Utilities

Canadian Western Natural Gas

Centel

Centra Gas

Central Illinois Light & Power Co

Central Telephone

Central South West Corp.

Cincinnatti Gas & Electric

CONSULTING CLIENTS (CONT'D)

Cinergy Corp

Citizens Utilities

City Gas of Florida

CN-CP Telecommunications

Commonwealth Telephone Co.

Columbia Gas System

Consolidated Natural Gas

Constellation Energy

Deerpath Group

Edison International

Edmonton Power Company

Energen

Engraph Corporation

Entergy Corp.

Entergy Arkansas Inc.

Entergy Gulf States Utilities, Inc.

Entergy Louisiana, Inc.

Entergy New Orleans, Inc.

Florida Water Association

Fortis

Garmaise-Thomson & Assoc., Investment Consultants

Gaz Metropolitain

General Public Utilities

Georgia Broadcasting Corp.

Georgia Power Company

GTE California

CONSULTING CLIENTS (CONT'D)

GTE Northwest Inc

GTE Service Corp.

GTE Southwest Incorporated

Gulf Power Company

Havasu Water Inc.

Hope Gas Inc.

Hydro-Quebec

ICG Utilities

Illinois Commerce Commission

Island Telephone

Jersey Central Power & Light

Kansas Power & Light

Manitoba Hydro

Maritime Telephone

Metropolitan Edison Co.

Minister of Natural Resources Province of Quebec

Minnesota Power & Light

Mississippi Power Company

Mountain Bell

Nevada Power Company

Newfoundland Board of Public Utilities

Newfoundland Light & Power - Fortis Inc.

New Tel Enterprises Ltd.

New York Telephone Co.

Nova Scotia Utility and Review Board

Northern Telephone Ltd.

CONSULTING CLIENTS (CONT'D)

Northwestern Bell

Northwestern Utilities Ltd.

NUI Corp

NYNEX

OG&E

Oklahoma G & E

Ontario Telephone Service Commission

Orange & Rockland

Pacific Northwest Bell

People's Gas System Inc.

People's Natural Gas

Pennsylvania Electric Co.

Price Waterhouse

PSI Energy

Public Service Elec & Gas

Quebec Telephone

Regie de l'Energie du Quebec

Rochester Telephone

SaskPower

Sierra Pacific Power Company

Sierra Pacific Resources

Southern Bell

Southern States Utilities

South Central Bell

Sun City Water Company

TECO Energy

CONSULTING CLIENTS (CONT'D)

The Southern Company

Touche Ross and Company

Trans-Quebec & Maritimes Pipeline

US WEST Communications

Union Heat Light & Power

Utah Power & Light

Vermont Gas Systems Inc.

MANAGEMENT DEVELOPMENT AND PROFESSIONAL EXECUTIVE EDUCATION

- Canadian Institute of Marketing, Corporate Finance, 1971-73
- Hydro-Quebec, "Capital Budgeting Under Uncertainty, 1974-75
- Institute of Certified Public Accountants, Mergers & Acquisitions, 1975-78
- Investment Dealers Association of Canada, 1977-78
- Financial Research Foundation, bi-annual seminar, 1975-79
- Advanced Management Research (AMR), faculty member, 1977-80
- Financial Analysts Federation, Educational chapter: "Financial Futures Contracts" seminar
- Exnet Inc. a.k.a. The Management Exchange Inc., faculty member, 1981-2002, National Seminars:

Risk and Return on Capital Projects

Cost of Capital for Regulated Utilities

Capital Allocation for Utilities

Alternative Regulatory Frameworks

Utility Directors' Workshop

Shareholder Value Creation for Utilities

Real Options in Utility Capital Investments

Fundamentals of Utility Finance in a Restructured Environment

- Georgia State University College of Business, Management Development Program, faculty member, 1981-1994

EXPERT TESTIMONY & UTILITY CONSULTING AREAS OF EXPERTISE

Rate of Return

Capital Structure

Generic Cost of Capital

Phase-in Plans

Costing Methodology

Depreciation

Flow-Through vs Normalization

Revenue Requirements Methodology

Utility Capital Expenditures Analysis

Risk Analysis

Capital Allocation

Divisional Cost of Capital, Unbundling

Publicly-owned Municipals

Telecommunications, CATV, Energy, Pipeline, Water

Incentive Regulation & Alternative Regulatory Plans

Shareholder Value Creation

Value-Based Management

REGULATORY BODIES:

Federal Communications Commission

Federal Energy Regulatory Commission

Georgia Public Service Commission

South Carolina Public Service Commission

North Carolina Utilities Commission

Pennsylvania Public Service Commission

Ontario Telephone Service Commission

Quebec Telephone Service Commission

Newfoundland Board of Commissioners of Public Utilities

Georgia Senate Committee on Regulated Industries

Alberta Public Service Board

Tennessee Public Service Commission

Oklahoma State Board of Equalization

Mississippi Public Service Commission

Minnesota Public Utilities Commission

Canadian Radio-Television & Telecommunications Comm.

New Brunswick Board of Public Commissioners

Alaska Public Utility Commission

National Energy Board of Canada

Florida Public Service Commission

Montana Public Service Commission

Arizona Corporation Commission

Quebec Natural Gas Board

Quebec Regie de l'Energie

New York Public Service Commission

Washington Utilities & Transportation Commission

Manitoba Board of Public Utilities

New Jersey Board of Public Utilities

Alabama Public Service Commission

Utah Public Service Commission

Nevada Public Service Commission

Louisiana Public Service Commission

Colorado Public Utilities Board

West Virginia Public Service Commission

Ohio Public Utilities Commission

California Public Service Commission

Hawaii Public Service Commission

Illinois Commerce Commission

British Columbia Board of Public Utilities

Indiana Utility Regulatory Commission

Minnesota Public Utilities Commission

Texas Public Service Commission

Michigan Public Service Commission

Iowa Board of Public Utilities

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Southern Bell, So. Carolina PSC, Docket #82-294C

Southern Bell, North Carolina PSC, Docket #P-55-816

Metropolitan Edison, Pennsylvania PUC, Docket #R-822249

Pennsylvania Electric, Pennsylvania PUC,Docket#R-822250

Georgia Power, Georgia PSC, Docket # 3270-U, 1981

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Quebec Northern Telephone, Quebec PSC

Edmonton Power Company, Alberta Public Service Board

Kansas Power & Light, F.E.R.C., Docket # ER 83-418

NYNEX, FCC generic cost of capital Docket #84-800

Bell South, FCC generic cost of capital Docket #84-800

American Water Works - Tennessee, Docket #7226

Burlington-Northern - Oklahoma State Board of Taxes

Georgia Power, Georgia PSC, Docket # 3549-U

GTE Service Corp., FCC Docket #84-200

Mississippi Power Co., Miss. PSC, Docket U-4761

Citizens Utilities, Ariz. Corp. Comm., D # U2334-86020

Quebec Telephone, Quebec PSC, 1986, 1987, 1992

Newfoundland L & P, Nfld. Brd. Publ Comm. 1987, 1991

Northwestern Bell, Minnesota PSC, #P-421/CI-86-354

GTE Service Corp., FCC Docket #87-463

Anchorage Municipal Power & Light, Alaska PUC, 1988

New Brunswick Telephone, N.B. PUC, 1988

Trans-Quebec Maritime, Nat'l Energy Brd. of Cda, '88-92

Gulf Power Co., Florida PSC, Docket #88-1167-EI

Mountain States Bell, Montana PSC, #88-1.2

Mountain States Bell, Arizona CC, #E-1051-88-146

Georgia Power, Georgia PSC, Docket # 3840-U, I989

Rochester Telephone, New York PSC, Docket # 89-C-022

Noverco - Gaz Metro, Quebec Natural Gas PSC, #R-3164-89

GTE Northwest, Washington UTC, #U-89-3031

Orange & Rockland, New York PSC, Case 89-E-175

Central Illinois Light Company, ICC, Case 90-0127

Peoples Natural Gas, Pennsylvania PSC, Case

Gulf Power, Florida PSC, Case # 891345-EI

ICG Utilities, Manitoba BPU, Case 1989

New Tel Enterprises, CRTC, Docket #90-15

Peoples Gas Systems, Florida PSC

Jersey Central Pwr & Light, N.J. PUB, Case ER 89110912J

Alabama Gas Co., Alabama PSC, Case 890001

Trans-Quebec Maritime Pipeline, Cdn. Nat'l Energy Board

Mountain Bell, Utah PSC,

Mountain Bell, Colorado PUB

South Central Bell, Louisiana PS

Hope Gas, West Virginia PSC

Vermont Gas Systems, Vermont PSC

Alberta Power Ltd., Alberta PUB

Ohio Utilities Company, Ohio PSC

Georgia Power Company, Georgia PSC

Sun City Water Company

Havasu Water Inc.

Centra Gas (Manitoba) Co.

Central Telephone Co. Nevada

AGT Ltd., CRTC 1992

BC GAS, BCPUB 1992

California Water Association, California PUC 1992

Maritime Telephone 1993

BCE Enterprises, Bell Canada, 1993

Citizens Utilities Arizona gas division 1993

PSI Resources 1993-5

CILCORP gas division 1994

GTE Northwest Oregon 1993

Stentor Group 1994-5

- Bell Canada 1994-1995
- PSI Energy 1993, 1994, 1995, 1999
- Cincinnati Gas & Electric 1994, 1996, 1999
- Southern States Utilities, 1995
- CILCO 1995, 1999
- Commonwealth Telephone 1996
- Edison International 1996, 1998
- Citizens Utilities 1997
- Stentor Companies 1997
- Hydro-Quebec 1998
- Entergy Gulf States Louisiana 1998
- Detroit Edison, 1999
- Entergy Gulf States, Texas, 2000
- Hydro Quebec TransEnergie, 2001
- Sierra Pacific Company, 2000, 2001, 2002
- Nevada Power Company, 2001
- Mid American Energy, 2001, 2002
- Entergy Louisiana Inc. 2001, 2002

Mississippi Power Company, 2001, 2002

Entergy Gulf States, Louisiana, 2001, 2002

Oklahoma Gas & Electric Company, 2002

Public Service Electric & Gas, 2001, 2002

NUI Corp (Elizabethtown Gas Company), 2002

Jersey Central Power & Light, 2002

PROFESSIONAL AND LEARNED SOCIETIES

- Engineering Institute of Canada, 1967-1972
- Canada Council Award, recipient 1971 and 1972
- Canadian Association Administrative Sciences, 1973-80
- American Association of Decision Sciences, 1974-1978
- American Finance Association, 1975-2002
- Financial Management Association, 1978-2002

ACTIVITIES IN PROFESSIONAL ASSOCIATIONS AND MEETINGS

- Chairman of meeting on "New Developments in Utility Cost of Capital", Southern Finance Association, Atlanta, Nov. 1982

- Chairman of meeting on "Public Utility Rate of Return", Southeastern Public Utility Conference, Atlanta, Oct. 1982

- Chairman of meeting on "Current Issues in Regulatory Finance", Financial Management Association, Atlanta, Oct. 1983

- Chairman of meeting on "Utility Cost of Capital", Financial Management Association, Toronto, Canada, Oct. 1984.

- Committee on New Product Development, FMA, 1985

- Discussant, "Tobin's Q Ratio", paper presented at Financial

Management Association, New York, N.Y., Oct. 1986

- Guest speaker, "Utility Capital Structure: New Developments", National Society of Rate of Return Analysts 18th Financial Forum, Wash., D.C. Oct. 1986

- Opening address, "Capital Expenditures Analysis: Methodology vs Mythology," Bellcore Economic Analysis Conference, Naples Fla., 1988.

PAPERS PRESENTED:

"An Empirical Study of Multiperiod Asset Pricing," annual meeting of Financial Management Assoc., Las Vegas Nevada, 1987.

"Utility Capital Expenditures Analysis: Net Present Value vs Revenue Requirements", annual meeting of Financial Management Assoc., Denver, Colorado, October 1985.

"Intervention Analysis and the Dynamics of Market Efficiency", annual meeting of Financial Management Assoc., San Francisco, Oct. 1982

"Intertemporal Market-Line Theory: An Empirical Study," annual meeting of Eastern Finance Assoc., Newport, R.I. 1981

"Option Writing for Financial Institutions: A Cost-Benefit Analysis", 1979 annual meeting Financial Research Foundation
"Free-lunch on the Toronto Stock Exchange", annual meeting of Financial Research Foundation of Canada, l978.

"Simulation System Computer Software SIMFIN", HP International Business Computer Users Group, London, 1975.

"Inflation Accounting: Implications for Financial Analysis." Institute of Certified Public Accountants Symposium, 1979.

OFFICES IN PROFESSIONAL ASSOCIATIONS

- President, International Hewlett-Packard Business Computers Users Group, 1977

- Chairman Program Committee, International HP Business Computers Users Group, London, England, 1975

- Program Coordinator, Canadian Assoc. of Administrative Sciences, 1976

- Member, New Product Development Committee, Financial Management Association, 1985-1986

- Reviewer: Journal of Financial Research

  Financial Management

  Financial Review

  Journal of Finance

PUBLICATIONS

"Risk Aversion Revisited", Journal of Finance, Sept. 1983

"Hedging Regulatory Lag with Financial Futures," Journal of Finance, May 1983. (with G. Gay, R. Kolb)

"The Effect of CWIP on Cost of Capital," Public Utilities Fortnightly, July 1986.

"The Effect of CWIP on Revenue Requirements" Public Utilities Fortnightly, August 1986.

"Intervention Analysis and the Dynamics of Market Efficiency," Time-Series Applications, (New York: North Holland, 1983. (with K. El-Sheshai)

"Market-Line Theory and the Canadian Equity Market," Journal of Business Administration, Jan. I982, M. Brennan, editor

"Efficiency of Canadian Equity Markets," International Management Review, Feb. 1978

"Intertemporal Market-Line Theory: An Empirical Test," Financial Review, Proceedings of the Eastern Finance Association, 1981

BOOKS

Utilities' Cost of Capital, Public Utilities Reports Inc., Arlington, Va., 1984.

Regulatory Finance, Public Utilities Reports Inc., Arlington, Va., 1994

Driving Shareholder Value, McGraw-Hill, January 2001

MONOGRAPHS

Determining Cost of Capital for Regulated Industries, Public Utilities Reports, Inc., and The Management Exchange Inc., 1982 - 1993. (with V.L. Andrews)

Alternative Regulatory Frameworks, Public Utilities Reports, Inc., and The Management Exchange Inc., 1993. (with V.L. Andrews)

Risk and Return in Capital Projects, The Management Exchange Inc., 1980,(with B. Deschamps)

Utility Capital Expenditure Analysis, The Management Exchange Inc., 1983.

Regulation of Cable Television: An Econometric Planning Model, Quebec Department of Communications, 1978.

“An Economic & Financial Profile of the Canadian Cablevision Industry”. Canadian Radio-Television & Telecommunication Commission (CRTC), 1978

Computer Users' Manual: Finance and Investment Programs, University of Montreal Press, 1974, revised 1978.

Fiber Optics Communications: Economic Characteristics, Quebec Department of Communications, 1978.

"Canadian Equity Market Inefficiencies", Capital Market Research Memorandum, Garmaise & Thomson Investment Consultants, 1979.

MISCELLANEOUS CONSULTING REPORTS

“Operational Risk Analysis: California Water Utilities, Calif. Water Association, 1993.

"Cost of Capital Methodologies for Independent Telephone Systems", Ontario Telephone Service Commission, March 1989.

"The Effect of CWIP on Cost of Capital and Revenue Requirements", Georgia Power Company,1985.

"Costing Methodology and the Effect of Alternate Depreciation and Costing Methods on Revenue Requirements and Utility Finances", Gaz Metropolitan Inc., 1985.

"Simulated Capital Structure of CN-CP Telecommunications: A Critique", CRTC, 1977.

"Telecommunications Cost Inquiry: Critique",CRTC,1977.

"Social Rate of Discount in the Public Sector", CRTC Policy Statement 1974.

"Technical Problems in Capital Projects Analysis", CRTC Policy Statement, 1974.

RESEARCH GRANTS

"Econometric Planning Model of the Cablevision Industry", International Institute of Quantitative Economics, CRTC

"Application of the Averch-Johnson Model to Telecommunications Utilities", Canadian Radio-Television Commission (CRTC)

"Economics of the Fiber Optics Industry", Quebec Dept. of Communications

"Intervention Analysis and the Dynamics of Market Efficiency", Georgia State Univ. College of Business, 1981

"Firm Size and Beta Stability", Georgia State University College of Business, 1982

"Risk Aversion and the Demand for Risky Assets", Georgia State University College of Business, 1981.

Chase Econometrics, Interactive Data Corp., Research Grant, $50,000 per annum, 1986-1989.

UNIVERSITY SERVICE

- University Senate, elected departmental senator 1987-1989, 1998-2002
- Faculty Affairs Committee, elected departmental representative
- Professional Continuing Education Committee member
- Director Master in Science (Finance) Program
- Course Coordinator, Corporate Finance, MBA program
    - Chairman, Corporate Finance Curriculum Committee
    - Executive Education: Departmental Coordinator 2000
    - University Senate Committee on Commencement
    - University Senate Committee on Student Discipline

CANADIAN UTILITY COMPANIES
BETA RISK MEASURES

	Company	Beta (2)
1	ATCO Ltd.	0.45
2	BC Gas Inc.	0.55
3	Canadian Natural Resources	0.80
4	Canadian Utilities 'B'	0.55
5	Emera Inc	0.55
6	Enbridge Inc.	0.55
7	Fortis Inc.	0.50
8	Nova Chemicals Corp	0.75
9	Pacific Northern Gas Ltd.	0.55
10	TransAlta Corp.	0.60
11	TransCanada Pipe.	0.55
	AVERAGE	**0.58**

Source: Value Line Investment Survey for Windows 5/2002

NATURAL GAS DISTRIBUTION UTILITIES
BETA RISK MEASURES

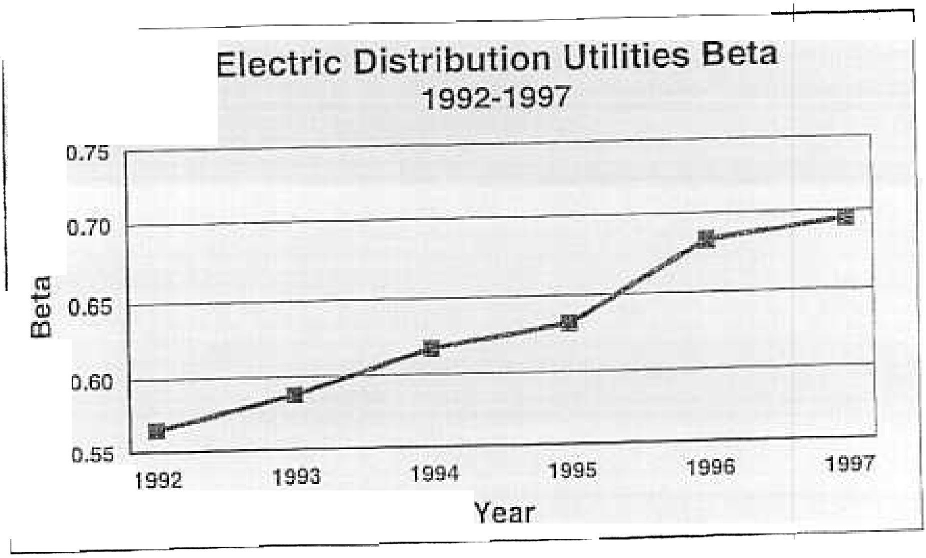
	Company	Industry (1)	Beta (2)
1	AGL Resources	GASDISTR	0.60
2	AmeriGas Partners	GASDISTR	0.55
3	Atmos Energy	GASDISTR	0.55
4	Energen Corp.	GASDISTR	0.75
5	KeySpan Corp.	GASDISTR	0.55
6	NICOR Inc.	GASDISTR	0.60
7	New Jersey Resources	GASDISTR	0.60
8	Northwest Nat. Gas	GASDISTR	0.60
9	ONEOK Inc.	GASDISTR	0.80
10	Peoples Energy	GASDISTR	0.70
11	Piedmont Natural Gas	GASDISTR	0.60
12	Southern Union	GASDISTR	0.80
13	Southwest Gas	GASDISTR	0.65
14	UGI Corp.	GASDISTR	0.70
15	WGL Holdings Inc.	GASDISTR	0.60
	AVERAGE		**0.64**

Source: Value Line Investment Survey for Windows, 05/2002

U.S. ELECTRIC DISTRIBUTION UTILITIES
BETA RISK MEASURES PRE-RESTRUCTURING

	Company Name	1992	1993	1994	1995	1996	1997
1	Bangor Hydro Elec.	0.60	0.60	0.65	0.70	0.75	0.75
2	Cen. La. Electric	0.55	0.50	0.55	0.60	0.60	0.70
3	Cen. Maine Power	0.55	0.65	0.65	0.70	0.85	0.85
4	Cen. Vermont Pub. Serv.	0.55	0.65	0.70	0.65	0.80	0.75
5	Commonwealth Energy	0.65	0.65	0.65	0.65	0.75	0.80
6	Consol. Edison	0.65	0.75	0.75	0.75	0.75	0.80
7	Empire Dist. Elec.	0.40	0.45	0.50	0.55	0.55	0.60
8	Enova Corp.	0.60	0.55	0.60	0.65	0.70	0.75
9	GPU, Inc.	0.65	0.65	0.70	0.75	0.80	0.85
10	Green Mountain Pwr.	0.55	0.55	0.60	0.60	0.55	0.55
11	Hawaiian Elec.	0.60	0.70	0.70	0.75	0.70	0.70
12	Madison Gas & Elec.	0.50	0.60	0.60	0.60	0.60	0.50
13	Maine Public Service	0.50	0.60	0.55	0.55	0.55	0.65
14	Nevada Power	0.60	0.65	0.70	0.70	0.75	0.70
15	Orange & Rockland	0.55	0.50	0.55	0.50	0.60	0.60
16	Puget Sound Energy	0.65	0.65	0.65	0.60	0.70	0.70
17	Sierra Pacific Res.	0.50	0.50	0.60	0.60	0.65	0.70
18	UNITIL Corp.	0.50	0.45	0.50	0.55	0.65	0.55
19	Upper Peninsula Energy	0.50	0.50	0.50	0.55	0.65	0.75
20	UtiliCorp United	0.65	0.60	0.65	0.65	0.70	0.65
	AVERAGE	**0.57**	**0.59**	**0.62**	**0.63**	**0.68**	**0.70**

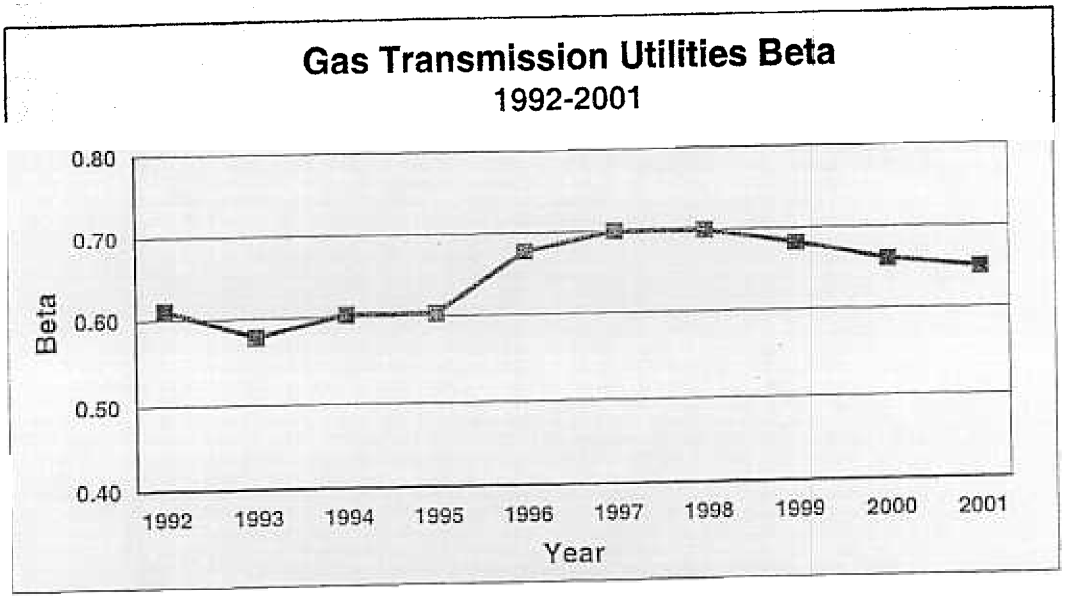
Source: Value Line Investment Survey


Electric Distribution Utilities Beta
1992-1997
Beta
0.75
0.70
0.65
0.60
0.55
1992
1993
1994
1995
1996
1997
Year

NATURAL GAS TRANSMISSION UTILITIES
BETA RISK MEASURES

Company Name	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1 Atmos Energy	0.60	0.50	0.55	0.55	0.65	0.60	0.55	0.55	0.55	0.55
2 BC Gas Inc.	0.50	0.50	0.55	0.55	0.55	0.60	0.60	0.65	0.55	0.60
3 Cascade Natural Gas	0.60	0.55	0.55	0.50	0.55	0.55	0.60	0.55	0.55	0.55
4 Delta Natural Gas	0.55	0.50	0.50	0.50	0.40	0.45	0.45	0.45	0.45	0.45
5 El Paso Natural Gas			0.65	0.70	0.70	0.75	0.70	0.85	0.80	0.80
6 KCS Energy	0.60	0.55	0.60	0.60	0.85	0.90	1.05	1.05	0.85	1.00
7 KeySpan Energy	0.50	0.45	0.50	0.45	0.60	0.70				0.55
8 National Fuel Gas	0.70	0.60	0.65	0.65	0.75	0.80	0.75	0.60	0.65	0.55
9 ONEOK Inc.	0.75	0.75	0.75	0.75	0.80	0.75	0.75	0.70	0.70	0.70
10 Pacific Northern Gas	0.40	0.40	0.40	0.40	0.45	0.55	0.50	0.45	0.55	0.50
11 Questar Corp.	0.70	0.65	0.70	0.80	0.95	0.90	0.80	0.70	0.70	0.65
12 SEMCO Energy Inc.	0.45	0.45	0.45	0.45	0.55	0.60	0.60	0.65	0.65	0.60
13 TransCanada Pipe	0.65	0.55	0.60	0.65	0.70	0.75	0.80	0.65	0.70	0.60
14 Western Gas Res	0.50	0.60	0.55	0.55	0.55	0.65	0.70	0.80	0.70	0.70
15 Williams Cos.	1.05	1.05	1.05	0.95	1.10	0.95	0.95	0.90	0.85	0.95
AVERAGE	**0.61**	**0.58**	**0.60**	**0.60**	**0.68**	**0.70**	**0.70**	**0.68**	**0.66**	**0.65**

Source: Value Line Investment Survey 5/2002


Gas Transmission Utilities Beta
1992-2001
0.80
0.70
0.60
0.50
0.40
Beta
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
Year

BUSINESS RISK BETAS
CANADIAN ENERGY UTILITIES

	Company Name	Beta	Equity Ratio	Unlevered Beta
1	ATCO Ltd.	0.45	0.23	0.10
2	BC Gas Inc.	0.55	0.30	0.17
3	Canadian Natural Resources	0.80	0.55	0.44
4	Canadian Utilities 'B'	0.55	0.36	0.20
5	Emera Inc	0.55	0.42	0.23
6	Enbridge Inc.	0.55	0.28	0.15
7	Fortis Inc.	0.50	0.36	0.18
8	Nova Chemicals Corp	0.75	0.40	0.30
9	Pacific Northern Gas Ltd.	0.55	0.47	0.26
10	TransAlta Corp.	0.60	0.35	0.21
11	TransCanada Pipe.	0.55	0.29	0.16
	AVERAGE	**0.58**	**0.36**	**0.22**

Source: Value Line Investment Survey for Windows 5/2002

MOODY'S ELECTRIC UTILITY COMMON STOCKS
OVER LONG-TERM TREASURY BONDS
ANNUAL LONG-TERM RISK PREMIUM ANALYSIS

Year	Long-Term Government Bond Yield (1)	20 year Maturity Bond Value (2)	Gain/Loss (3)	Interest (4)	Bond Total Return (5)	Moody's Electric Utility Stock Index (6)	Dividend (7)	Capital Gain/(Loss) % Growth (8)	Yield (9)	Stock Total Return (10)	Equity Risk Premium (11)
1931	4.07%	1,000.00				43.23					
1932	3.15%	1,135.75	135.75	40.70	17.64%	39.42	2.63	-8.81%	6.08%	-2.73%	-20.37%
1933	3.36%	969.60	(30.40)	31.50	0.11%	28.73	1.95	-27.12%	4.95%	-22.17%	-22.28%
1934	2.93%	1,064.73	64.73	33.60	9.83%	21.06	1.60	-26.70%	5.57%	-21.13%	-30.96%
1935	2.76%	1,025.99	25.99	29.30	5.53%	36.06	1.32	71.23%	6.27%	77.49%	71.96%
1936	2.55%	1,032.74	32.74	27.60	6.03%	41.60	1.48	15.36%	4.10%	19.47%	13.43%
1937	2.73%	972.40	(27.60)	25.50	-0.21%	24.24	1.74	-41.73%	4.18%	-37.55%	-37.34%
1938	2.52%	1,032.83	32.83	27.30	6.01%	27.55	1.50	13.66%	6.19%	19.84%	13.83%
1939	2.26%	1,041.65	41.65	25.20	6.68%	28.85	1.48	4.72%	5.37%	10.09%	3.41%
1940	1.94%	1,052.84	52.84	22.60	7.54%	22.22	1.54	-22.98%	5.34%	-17.64%	-25.19%
1941	2.04%	983.64	(16.36)	19.40	0.30%	13.45	1.44	-39.47%	6.48%	-32.99%	-33.29%
1942	2.46%	933.97	(66.03)	20.40	-4.56%	14.29	1.26	6.25%	9.37%	15.61%	20.18%
1943	2.48%	996.86	(3.14)	24.60	2.15%	21.01	1.28	47.03%	8.96%	55.98%	53.84%
1944	2.46%	1,003.14	3.14	24.80	2.79%	21.09	1.31	0.38%	6.24%	6.62%	3.82%
1945	1.99%	1,077.23	77.23	24.60	10.18%	31.14	1.30	47.65%	6.16%	53.82%	43.63%
1946	2.12%	978.90	(21.10)	19.90	-0.12%	32.71	1.43	5.04%	4.59%	9.63%	9.75%
1947	2.43%	951.13	(48.87)	21.20	-2.77%	25.60	1.56	-21.74%	4.77%	-16.97%	-14.20%
1948	2.37%	1,009.51	9.51	24.30	3.38%	26.20	1.60	2.34%	6.25%	8.59%	5.21%
1949	2.09%	1,045.58	45.58	23.70	6.93%	30.57	1.66	16.68%	6.34%	23.02%	16.09%
1950	2.24%	975.93	(24.07)	20.90	-0.32%	30.81	1.76	0.79%	5.76%	6.54%	6.86%
1951	2.69%	930.75	(69.25)	22.40	-4.69%	33.85	1.88	9.87%	6.10%	15.97%	20.65%
1952	2.79%	984.75	(15.25)	26.90	1.17%	37.85	1.91	11.82%	5.64%	17.46%	16.29%
1953	2.74%	1,007.66	7.66	27.90	3.56%	39.61	2.01	4.65%	5.31%	9.96%	6.40%
1954	2.72%	1,003.07	3.07	27.40	3.05%	47.56	2.13	20.07%	5.38%	25.45%	22.40%
1955	2.95%	965.44	(34.56)	27.20	-0.74%	49.35	2.21	3.76%	4.65%	8.41%	9.15%
1956	3.45%	928.19	(71.81)	29.50	-4.23%	48.96	2.32	-0.79%	4.70%	3.91%	8.14%
1957	3.23%	1,032.23	32.23	34.50	6.67%	50.30	2.43	2.74%	4.96%	7.70%	1.03%
1958	3.82%	918.01	(81.99)	32.30	-4.97%	66.37	2.50	31.95%	4.97%	36.92%	41.89%
1959	4.47%	914.65	(85.35)	38.20	-4.71%	65.77	2.61	-0.90%	3.93%	3.03%	7.74%

MOODY'S ELECTRIC UTILITY COMMON STOCKS
OVER LONG-TERM TREASURY BONDS
ANNUAL LONG-TERM RISK PREMIUM ANALYSIS

	Long-Term Government Bond Yield	20 year Maturity Bond Value	Gain/Loss	Interest	Bond Total Return	Moody's Electric Utility Stock Index	Dividend	Capital Gain/(Loss) % Growth	Yield	Stock Total Return	Equity Risk Premium
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	3.80%	1,093.27	93.27	44.70	13.80%	76.82	2.68	16.80%	4.07%	20.88%	7.08%
1961	4.15%	952.75	(47.25)	38.00	-0.92%	99.32	2.81	29.29%	3.66%	32.95%	33.87%
1962	3.95%	1,027.48	27.48	41.50	6.90%	96.49	2.97	-2.85%	2.99%	0.14%	-6.76%
1963	4.17%	970.35	(29.65)	39.50	0.99%	102.31	3.21	6.03%	3.33%	9.36%	8.37%
1964	4.23%	991.96	(8.04)	41.70	3.37%	115.54	3.43	12.93%	3.35%	16.28%	12.92%
1965	4.50%	964.64	(35.36)	42.30	0.69%	114.86	3.86	-0.59%	3.34%	2.75%	2.06%
1966	4.55%	993.48	(6.52)	45.00	3.85%	105.99	4.11	-7.72%	3.58%	-4.14%	-7.99%
1967	5.56%	879.01	(120.99)	45.50	-7.55%	98.19	4.34	-7.36%	4.09%	-3.26%	4.29%
1968	5.98%	951.38	(48.62)	55.60	0.70%	104.04	4.50	5.96%	4.58%	10.54%	9.84%
1969	6.87%	904.00	(96.00)	59.80	-3.62%	84.62	4.61	-18.67%	4.43%	-14.23%	-10.62%
1970	6.48%	1,043.38	43.38	68.70	11.21%	88.59	4.70	4.69%	5.55%	10.25%	-0.96%
	5.97%	1,059.09	59.09	64.80	12.39%	85.56	4.77	-3.42%	5.38%	1.96%	-10.42%
1972	5.99%	997.69	(2.31)	59.70	5.74%	83.61	4.87	-2.28%	5.69%	3.41%	-2.33%
1973	7.26%	867.09	(132.91)	59.90	-7.30%	60.87	5.01	-27.20%	5.99%	-21.21%	-13.90%
1974	7.60%	965.33	(34.67)	72.60	3.79%	41.17	4.83	-32.36%	7.93%	-24.43%	-28.22%
1975	8.05%	955.63	(44.37)	76.00	3.16%	55.66	4.97	35.20%	12.07%	47.27%	44.10%
1976	7.21%	1,088.25	88.25	80.50	16.87%	66.29	5.18	19.10%	9.31%	28.40%	11.53%
1977	8.03%	919.03	(80.97)	72.10	-0.89%	68.19	5.54	2.87%	8.36%	11.22%	12.11%
1978	8.98%	912.47	(87.53)	80.30	-0.72%	59.75	5.81	-12.38%	8.52%	-3.86%	-3.13%
1979	10.12%	902.99	(97.01)	89.80	-0.72%	56.41	6.22	-5.59%	10.41%	4.82%	5.54%
1980	11.99%	859.23	(140.77)	101.20	-3.96%	54.42	6.58	-3.53%	11.66%	8.14%	12.09%
1981	13.34%	906.45	(93.55)	119.90	2.63%	57.20	6.99	5.11%	12.84%	17.95%	15.32%
1982	10.95%	1,192.38	192.38	133.40	32.58%	70.26	7.43	22.83%	12.99%	35.82%	3.24%
1983	11.97%	923.12	(76.88)	109.50	3.26%	72.03	7.87	2.52%	11.20%	13.72%	10.46%
1984	11.70%	1,020.70	20.70	119.70	14.04%	80.16	8.26	11.29%	11.47%	22.75%	8.71%
1985	9.56%	1,189.27	189.27	117.00	30.63%	94.98	8.61	18.49%	10.74%	29.23%	-1.40%
1986	7.89%	1,166.63	166.63	95.60	26.22%	113.66	8.89	19.67%	9.36%	29.03%	2.80%
1987	9.20%	881.17	(118.83)	78.90	-3.99%	94.24	9.12	-17.09%	8.02%	-9.06%	-5.07%
1988	9.18%	1,001.82	1.82	92.00	9.38%	100.94	8.87	7.11%	9.41%	16.52%	7.14%
1989	8.16%	1,099.75	99.75	91.80	19.16%	122.52	8.82	21.38%	8.74%	30.12%	10.96%

MOODY'S ELECTRIC UTILITY COMMON STOCKS
OVER LONG-TERM TREASURY BONDS
ANNUAL LONG-TERM RISK PREMIUM ANALYSIS

	Long-Term Government Bond Yield	20 year Maturity Bond Value	Gain/Loss	Interest	Bond Total Return	Moody's Electric Utility Stock Index	Dividend	Capital Gain/(Loss) % Growth	Yield	Stock Total Return	Equity Risk Premium
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1990	8.44%	973.17	(26.83)	81.60	5.48%	117.77	8.79	-3.88%	7.17%	3.30%	-2.18%
1991	7.30%	1,118.94	118.94	84.40	20.33%	144.02	8.95	22.29%	7.60%	29.89%	9.55%
1992	7.26%	1,004.19	4.19	73.00	7.72%	141.06	9.05	-2.06%	6.28%	4.23%	-3.49%
1993	6.54%	1,079.70	79.70	72.60	15.23%	146.70	8.99	4.00%	6.37%	10.37%	-4.86%
1994	7.99%	856.40	(143.60)	65.40	-7.82%	115.50	8.96	-21.27%	6.11%	-15.16%	-7.34%
1995	6.03%	1,225.98	225.98	79.90	30.59%	142.90	9.06	23.72%	7.84%	31.57%	0.98%
1996	6.73%	923.67	(76.33)	60.30	-1.60%	136.00	9.06	-4.83%	6.34%	1.51%	3.11%
1997	6.02%	1,081.92	81.92	67.30	14.92%	155.73	9.06	14.51%	6.66%	21.17%	6.25%
1998	5.42%	1,072.71	72.71	60.20	13.29%	181.44	8.01	16.51%	5.14%	21.65%	8.36%
1999	6.82%	848.41	(151.59)	54.20	-9.74%	137.30	8.06	-24.33%	4.44%	-19.89%	-10.15%
2000	5.58%	1,148.30	148.30	68.20	21.65%	227.09	8.71	65.40%	6.34%	71.74%	50.09%
											5.71%

Sourc(Moody's Public Utility Manual 2001 December stock prices and dividends

Bond yields from Ibbotson Associates 2001 Yearbook Table B-9 Long-Term Government Bonds Yields

December each year.

MOODY'S NATURAL GAS DISTRIBUTION COMMON STOCKS
OVER LONG-TERM TREASURY BONDS
ANNUAL LONG-TERM RISK PREMIUM ANALYSIS

Year	Long-Term Government Bond Yield (1)	20 year Maturity Bond Value (2)	Gain/Loss (3)	Interest (4)	Bond Total Return (5)	Moody's Natural Gas Distribution Stock Index (6)	Dividend (7)	Capital Gain/(Loss) % Growth (8)	Yield (9)	Stock Total Return (10)	Equity Risk Premium (11)
1954	2.72%	1,000.00				26.47					
1955	2.95%	965.44	(34.56)	27.20	-0.74%	28.10	1.38	6.16%	5.21%	11.37%	12.11%
1956	3.45%	928.19	(71.81)	29.50	-4.23%	28.23	1.48	0.46%	5.27%	5.73%	9.96%
1957	3.23%	1,032.23	32.23	34.50	6.67%	25.78	1.49	-8.68%	5.28%	-3.40%	-10.07%
1958	3.82%	918.01	(81.99)	32.30	-4.97%	38.71	1.57	50.16%	6.09%	56.25%	61.21%
1959	4.47%	914.65	(85.35)	38.20	-4.71%	39.59	1.66	2.27%	4.29%	6.56%	11.28%
1960	3.80%	1,093.27	93.27	44.70	13.80%	48.21	1.84	21.77%	4.65%	26.42%	12.62%
1961	4.15%	952.75	(47.25)	38.00	-0.92%	64.96	1.94	34.74%	4.02%	38.77%	39.69%
1962	3.95%	1,027.48	27.48	41.50	6.90%	59.73	2.02	-8.05%	3.11%	-4.94%	-11.84%
1963	4.17%	970.35	(29.65)	39.50	0.99%	64.62	2.18	8.19%	3.65%	11.84%	10.85%
1964	4.23%	991.96	(8.04)	41.70	3.37%	68.24	2.30	5.60%	3.56%	9.16%	5.80%
1965	4.50%	964.64	(35.36)	42.30	0.69%	64.31	2.48	-5.76%	3.63%	-2.12%	-2.82%
1966	4.55%	993.48	(6.52)	45.00	3.85%	53.50	2.61	-16.81%	4.06%	-12.75%	-16.60%
1967	5.56%	879.01	(120.99)	45.50	-7.55%	50.49	2.74	-5.63%	5.12%	-0.50%	7.04%
1968	5.98%	951.38	(48.62)	55.60	0.70%	53.80	2.81	6.56%	5.57%	12.12%	11.42%
1969	6.87%	904.00	(96.00)	59.80	-3.62%	43.88	2.93	-18.44%	5.45%	-12.99%	-9.37%
1970	6.48%	1,043.38	43.38	68.70	11.21%	52.33	3.01	19.26%	6.86%	26.12%	14.91%
1971	5.97%	1,059.09	59.09	64.80	12.39%	47.86	3.07	-8.54%	5.87%	-2.68%	-15.06%
1972	5.99%	997.69	(2.31)	59.70	5.74%	53.54	3.12	11.87%	6.52%	18.39%	12.65%
1973	7.26%	867.09	(132.91)	59.90	-7.30%	43.43	3.28	-18.88%	6.13%	-12.76%	-5.46%
1974	7.60%	965.33	(34.67)	72.60	3.79%	29.71	3.34	-31.59%	7.69%	-23.90%	-27.69%
1975	8.05%	955.63	(44.37)	76.00	3.16%	38.29	3.48	28.88%	11.71%	40.59%	37.43%
1976	7.21%	1,088.25	88.25	80.50	16.87%	51.80	3.70	35.28%	9.66%	44.95%	28.07%
1977	8.03%	919.03	(80.97)	72.10	-0.89%	50.88	3.93	-1.78%	7.59%	5.81%	6.70%
1978	8.98%	912.47	(87.53)	80.30	-0.72%	45.97	4.18	-9.65%	8.22%	-1.43%	-0.71%
1979	10.12%	902.99	(97.01)	89.80	-0.72%	53.50	4.44	16.38%	9.66%	26.04%	26.76%
1980	11.99%	859.23	(140.77)	101.20	-3.96%	56.61	4.68	5.81%	8.75%	14.56%	18.52%
1981	13.34%	906.45	(93.55)	119.90	2.63%	53.50	5.12	-5.49%	9.04%	3.55%	0.92%
1982	10.95%	1,192.38	192.38	133.40	32.58%	50.62	5.39	-5.38%	10.07%	4.69%	-27.89%
1983	11.97%	923.12	(76.88)	109.50	3.26%	55.79	5.55	10.21%	10.96%	21.18%	17.92%
1984	11.70%	1,020.70	20.70	119.70	14.04%	69.70	5.88	24.93%	10.54%	35.47%	21.43%
1985	9.56%	1,189.27	189.27	117.00	30.63%	76.58	6.22	9.87%	8.92%	18.79%	-11.83%
1986	7.89%	1,166.63	166.63	95.60	26.22%	90.89	5.71	18.69%	7.46%	26.14%	-0.08%
1987	9.20%	881.17	(118.83)	78.90	-3.99%	77.25	6.02	-15.01%	6.62%	-8.38%	-4.39%
1988	9.18%	1,001.82	1.82	92.00	9.38%	86.76	6.30	12.31%	8.16%	20.47%	11.08%
1989	8.16%	1,099.75	99.75	91.80	19.16%	117.05	6.58	34.91%	7.58%	42.50%	23.34%
1990	8.44%	973.17	(26.83)	81.60	5.48%	108.86	6.84	-7.00%	5.84%	-1.15%	-6.63%
1991	7.30%	1,118.94	118.94	84.40	20.33%	124.32	6.99	14.20%	6.42%	20.62%	0.29%
1992	7.26%	1,004.19	4.19	73.00	7.72%	138.79	7.14	11.64%	5.74%	17.38%	9.66%
1993	6.54%	1,079.70	79.70	72.60	15.23%	154.06	7.30	11.00%	5.26%	16.26%	1.03%
1994	7.99%	856.40	(143.60)	65.40	-7.82%	126.96	7.44	-17.59%	4.83%	-12.76%	-4.94%
1995	6.03%	1,225.98	225.98	79.90	30.59%	155.94	7.56	22.83%	5.95%	28.78%	-1.81%
1996	6.73%	923.67	(76.33)	60.30	-1.60%	166.64	7.91	6.86%	5.07%	11.93%	13.54%
1997	6.02%	1,081.92	81.92	67.30	14.92%	191.04	8.02	14.64%	4.81%	19.46%	4.53%
1998	5.42%	1,072.71	72.71	60.20	13.29%	177.24	8.13	-7.22%	4.26%	-2.97%	-16.26%
1999	6.82%	848.41	(151.59)	54.20	-9.74%	178.02	8.22	0.44%	4.64%	5.08%	14.82%
2000	5.58%	1,148.30	148.30	68.20	21.65%	219.86	8.22	23.50%	4.62%	28.12%	6.47%
MEAN					6.39%					12.44%	6.06%

Source: Moody's Public Utility Manual 2001 December stock prices and dividends
Bond yields from Ibbotson Associates 2001 Yearbook Table B-9 Long-Term Government Bonds Yields
December each year.

INVESTMENT GRADE COMBINATION GAS & ELEC UTILITIES
DCF ANALYSIS:ANALYSTS' GROWTH FORECASTS

Company	% Current Divid Yield (1)	Analysts' Growth Forecast (2)	% Expected Divid Yield (3)	Cost of Equity (4)
1 Allegheny Energy	4.7	7.4	5.1	12.5
2 Alliant Energy	7.1	5.3	7.5	12.8
3 Ameren Corp.	5.9	4.3	6.2	10.5
4 Aquila Inc.	7.2	8.1	7.8	15.9
5 Avista Corp.	2.9	6.0	3.1	9.1
6 CH Energy Group	4.2	5.0	4.4	9.4
7 CMS Energy Corp.	7.2	6.4	7.7	14.1
8 Cinergy Corp.	5.1	5.7	5.4	11.1
9 Conectiv	3.5	5.0	3.7	8.7
10 Consol. Edison	5.0	3.8	5.1	9.0
11 Constellation Energy	3.1	6.5	3.3	9.8
12 DTE Energy	4.6	6.7	4.9	11.6
13 Dominion Resources	3.9	9.7	4.3	14.0
14 Duke Energy	3.0	11.4	3.4	14.7
15 Energy East Corp.	4.3	5.6	4.6	10.2
16 Entergy Corp.	3.0	8.4	3.2	11.6
17 Exelon Corp.	3.2	7.4	3.4	10.7
18 MDU Resources	3.2	10.3	3.6	13.9
19 NSTAR	4.7	7.3	5.0	12.3
20 NiSource Inc.	5.1	6.5	5.4	11.9
21 NorthWestern Corp.	6.2	6.5	6.6	13.1
22 Northeast Utilities	2.8	3.0	2.8	5.8
23 PPL Corp.	3.8	8.6	4.2	12.8
24 Progress Energy	4.2	6.7	4.5	11.2
25 Public Serv. Enterprise	4.7	6.3	5.0	11.3
26 Puget Energy Inc.	4.9	5.3	5.2	10.4
27 RGS Energy Group	4.5	1.5	4.6	6.1
28 Reliant Energy	6.0	6.9	6.4	13.3
29 SCANA Corp.	4.2	5.0	4.4	9.4
30 Sempra Energy	4.0	7.3	4.3	11.5
31 TECO Energy	5.2	7.0	5.5	12.6
32 TXU Corp.	4.4	8.3	4.8	13.1
33 Vectren Corp.	4.3	7.3	4.6	11.9
34 WPS Resources	5.0	4.0	5.2	9.2
35 Wisconsin Energy	3.1	5.2	3.3	8.5
36 Xcel Energy Inc.	5.8	7.2	6.2	13.4
AVERAGE	**4.6**	**6.5**	**4.8**	**11.3**

Notes:
Column 1: Value Line Investment Survey for Windows, 05/2002
Column 2: Zacks long-term earnings growth forecast, 06/2002
Column 3 = Column 1 times (1 + Column 2/100)
Column 4 = Column 3 + Column 2

INVESTMENT GRADE COMBINATION GAS & ELEC UTILITIES
DCF ANALYSIS:VALUE LINE GROWTH PROJECTIONS

Company	% Current Divid Yield (1)	Proj EPS Growth (2)	% Expected Divid Yield (3)	Cost of Equity (4)
1 Allegheny Energy	4.7	11.0	5.2	16.2
2 Alliant Energy	7.1	6.0	7.6	13.6
3 Ameren Corp.	5.9	3.0	6.1	9.1
4 Aquila Inc.	7.2	9.5	7.9	17.4
5 Avista Corp.	2.9	6.5	3.1	9.6
6 CH Energy Group	4.2	1.5	4.2	5.7
7 CMS Energy Corp.	7.2	2.5	7.4	9.9
8 Cinergy Corp.	5.1	4.5	5.3	9.8
9 Conectiv	3.5	6.0	3.8	9.8
10 Consol. Edison	5.0	2.5	5.1	7.6
11 Constellation Energy	3.1	8.5	3.4	11.9
12 DTE Energy	4.6	8.5	5.0	13.5
13 Dominion Resources	3.9	16.0	4.5	20.5
14 Duke Energy	3.0	11.5	3.4	14.9
15 Energy East Corp.	4.3	3.0	4.5	7.5
16 Entergy Corp.	3.0	7.5	3.2	10.7
17 Exelon Corp.	3.2	7.4	3.4	10.7
18 MDU Resources	3.2	5.0	3.4	8.4
19 NSTAR	4.7	4.5	4.9	9.4
20 NiSource Inc.	5.1	14.0	5.8	19.8
21 NorthWestern Corp.	6.2	7.5	6.7	14.2
22 Northeast Utilities	2.8	3.0	2.8	5.8
23 PPL Corp.	3.8	7.0	4.1	11.1
24 Progress Energy	4.2	10.5	4.7	15.2
25 Public Serv. Enterprise	4.7	6.5	5.0	11.5
26 Puget Energy Inc.	4.9	2.0	5.0	7.0
27 RGS Energy Group	4.5	1.5	4.6	6.1
28 Reliant Energy	6.0	6.0	6.3	12.3
29 SCANA Corp.	4.2	7.0	4.5	11.5
30 Sempra Energy	4.0	7.5	4.3	11.8
31 TECO Energy	5.2	6.0	5.5	11.5
32 TXU Corp.	4.4	8.5	4.8	13.3
33 Vectren Corp.	4.3	11.0	4.8	15.8
34 WPS Resources	5.0	5.0	5.3	10.3
35 Wisconsin Energy	3.1	8.5	3.4	11.9
36 Xcel Energy Inc.	5.8	9.0	6.3	15.3
AVERAGE	4.6	6.8	4.9	11.7

Notes:
Column 1, 2: Value Line Investment Survey for Windows, 05/2002
Column 3 = Column 1 times (1 + Column 2/100)
Column 4 = Column 3 + Column 2
Growth rate unavailable for Exelon, Northeast Util; used Value Line growth

WORK DONE ON JUNE 11-13 FROM VLIS 05/0

NATURAL GAS DISTRIBUTION UTILITIES
DCF ANALYSIS: ANALYSTS' GROWTH FORECASTS

	Company	Industry (1)	Beta (2)	% Current Divid Yield (3)	Analysts Growth Forecast (4)	Expected Divid Yield (5)	Cost of Equity (6)
1	AGL Resources	GASDISTR	0.60	4.57	12.02	5.1	17.1
2	AmeriGas Partners	GASDISTR	0.55				
3	Atmos Energy	GASDISTR	0.55	4.95	6.36	5.3	11.6
4	Energen Corp.	GASDISTR	0.75	2.47	7.25	2.6	9.9
5	KeySpan Corp.	GASDISTR	0.55	4.95	7.86	5.3	13.2
6	NICOR Inc.	GASDISTR	0.60	3.91	6.60	4.2	10.8
7	New Jersey Resources	GASDISTR	0.60	3.72	8.05	4.0	12.1
8	Northwest Nat. Gas	GASDISTR	0.60	4.24	6.42	4.5	10.9
9	ONEOK Inc.	GASDISTR	0.80	2.75	9.40	3.0	12.4
10	Peoples Energy	GASDISTR	0.70	5.30	7.00	5.7	12.7
11	Piedmont Natural Gas	GASDISTR	0.60	4.24	6.15	4.5	10.7
12	Southern Union	GASDISTR	0.80				
13	Southwest Gas	GASDISTR	0.65	3.31	5.87	3.5	9.4
14	UGI Corp.	GASDISTR	0.70	5.08	5.88	5.4	11.3
15	WGL Holdings Inc.	GASDISTR	0.60	4.79	3.72	5.0	8.7
	AVERAGE		**0.64**	**4.2**	**7.1**	**4.5**	**11.6**

Notes:
Column 1, 2, 3: Value Line Investment Survey for Windows, 05/2002
Column 4: Zacks long-term earnings growth forecast, 06/2002
Column 5 = Column 3 times (1 + Column 4/100)
Column 6 = Column 5 + Column 4
Non-dividend paying American Gas Partners and Southern Union excluded.

% Deemed Equity Ratios
Canadian Distribution Utilities

		Common Equity Ratio	
Gas Distributors			
	Gaz Metro	38.5%	
	Alta Gas Utilites	41.4%	
	CU (Gas)	40.0%	
	Enbridge Consumers' Gas	35.0%	
	Pacific Northern Gas	36.0%	
	Centra BC	35.0%	
	Union Gas	35.0%	
	BC Gas Utility	33.0%	
	Centra Manitoba	39.1%	
	SaskEnergy	40.0%	
	Average		**37.3%**
Electric Distributors			
	Hydro One	35.0%	
	Newfoundland Power	45.0%	
	Maritime Electric	40.0%	
	ENMAX	40.2%	
	Average		**40.1%**
	Grand Average		**38.1%**

Source: DBRS "Canadian Gas and Electricity Distribution Utilities", June 2001

Canadian Gas & Electricity Distributors
% Debt in the Capital Structure

	1996	1997	1998	1999	2000
Gas Distributors					
Gaz Metro	51.4%	51.5%	53.5%	51.2%	53.6%
Alta Gas Utilites	56.3%	58.1%	60.5%	59.3%	57.0%
CU (Gas)	57.0%	57.5%	57.2%	57.4%	57.7%
Enbridge Consumers' Gas	68.8%	69.4%	69.4%	62.3%	61.6%
Pacific Northern Gas	61.1%	65.1%	64.5%	66.2%	62.6%
Centra BC	67.6%	67.2%	66.4%	65.4%	64.1%
Union Gas	69.5%	67.3%	64.8%	67.4%	67.0%
BC Gas Utility	68.3%	67.6%	65.9%	67.2%	67.3%
Centra Manitoba	60.5%	62.6%	64.9%	70.1%	70.6%
SaskEnergy	75.3%	73.4%	72.9%	71.8%	70.0%
Average	**63.6%**	**64.0%**	**64.0%**	**63.8%**	**63.2%**
Electricity Distributors					
Hydro One				54.6%	54.2%
Newfoundland Power	54.5%	55.1%	56.8%	56.3%	55.3%
Maritime Electric	57.6%	59.0%	56.8%	58.2%	55.7%
ENMAX	32.4%	38.1%	33.4%	30.5%	60.9%
Average	**48.2%**	**50.7%**	**49.0%**	**49.9%**	**56.5%**
Industry Average	**60.0%**	**60.9%**	**60.5%**	**59.9%**	**61.3%**

Source : DBRS; The Canadian Electric Utility Industry; November 2001

Actual Common Equity Ratios

Canadian Electric and Natural Gas Utilities

	Common Equity Ratio 2000	
Electric		
Canadian Utilities	37.2%	
Maritime Electric	42.0%	
Newfoundland Power	44.7%	
Nova Scotia Power	35.6%	
TransAlta Utilities	34.4%	
UtilityCorp Networks (BC)	34.6%	
AVERAGE		**38.1%**
Gas Distribution		
BC Gas Utility	32.7%	
Enbridge Consumer Gas	34.6%	
Gaz Métropolitain	40.3%	
Pacific Northern Gas	37.4%	
Union Gas	30.4%	
AVERAGE		**35.1%**
AVERAGE ALL COMPANIES		**36.7%**

Note 1: Capital structure ratios include short-term debt

Note 2: Common equity ratios include minority interests in common shares of subsidiaries

Source: Annual Reports

Actual Common Equity Ratios
Canadian Electric and Natural Gas Utilities

	Common Equity Ratio 2000	
Electric		
Canadian utilities	39.7%	
Maritime Electric	44.7%	
Newfoundland Power	46.3%	
Nova Scotia Power	38.5%	
TransAlta Utilities	37.5%	
UtilityCorp Networks (BC)	37.6%	
AVERAGE		**40.7%**
Gas Distribution		
BC Gas Utility	35.3%	
Enbridge Consumer Gas	37.9%	
Gaz Métropolitain	40.4%	
Pacific Northern Gas	43.3%	
Union Gas	35.8%	
AVERAGE		**38.5%**
AVERAGE ALL COMPANIES		**39.7%**

Note 1: Capital structure ratios exclude short-term debt
Note 2: Common equity ratios include minority interests in common shares of subsidiaries
Source: Annual Reports

U.S. Natural Gas & Utilities
% Common Equity Ratio

	Company Name	% Common Equity
1	AGL Resources	0.39
2	Alberta Energy Co. Ltd.	0.51
3	AmeriGas Partners	0.18
4	Atmos Energy	0.46
5	BC Gas Inc.	0.30
6	Canadian Utilities 'B'	0.36
7	Cascade Natural Gas	0.49
8	Chesapeake Utilities Corp.	0.58
9	Corning Natural Gas Corp	0.31
10	Energen Corp.	0.47
11	Energy West Inc.	0.50
12	EnergySouth Inc	0.44
13	FFP Marketing	0.33
14	Ferrellgas Partners L P	0.05
15	KeySpan Corp.	0.38
16	Laclede Group	0.50
17	Markwest Hydrocarbon	0.40
18	NATURAL GAS DISTRIB	0.42
19	NICOR Inc.	0.62
20	NUI Corp.	0.48
21	New Jersey Resources	0.50
22	Northwest Nat. Gas	0.51
23	ONEOK Inc.	0.46
24	Pacific Northern Gas Ltd.	0.47
25	Penn Octane Corp	0.61
26	Peoples Energy	0.56
27	Piedmont Natural Gas	0.52
28	RGC Resources Inc	0.58
29	SEMCO Energy	0.23
30	South Jersey Inds.	0.43
31	Southern Union	0.35
32	Southwest Gas	0.40
33	Streicher Mobile Fueling	0.48
34	Suburban Propane Partners	0.12
35	UGI Corp.	0.17
36	WGL Holdings Inc.	0.56
	AVERAGE	**0.42**

Source: Value Line Investment Survey 5/2002

U.S. Combination Gas & Elec Utilities
% Common Equity Ratio

	Company Name	% Common Equity
1	Allegheny Energy	0.40
2	Alliant Energy	0.43
3	Ameren Corp.	0.52
4	Aquila Inc.	0.56
5	Avista Corp.	0.36
6	CH Energy Group	0.65
7	CMS Energy Corp.	0.23
8	Cinergy Corp.	0.43
9	Conectiv	0.33
10	Consol. Edison	0.50
11	Constellation Energy	0.48
12	DTE Energy	0.37
13	Dominion Resources	0.38
14	Duke Energy	0.48
15	Energy East Corp.	0.38
16	Entergy Corp.	0.49
17	Exelon Corp.	0.35
18	Florida Public Utilities	0.36
19	MDU Resources	0.58
20	Madison Gas & Elec.	0.58
21	NSTAR	0.40
22	NiSource Inc.	0.36
23	NorthWestern Corp.	0.28
24	Northeast Utilities	0.49
25	PG&E Corp.	0.35
26	PPL Corp.	0.24
27	Progress Energy	0.38
28	Public Serv. Enterprise	0.27
29	Puget Energy Inc.	0.35
30	RGS Energy Group	0.46
31	Reliant Energy	0.49
32	SCANA Corp.	0.44
33	Sempra Energy	0.41
34	Sierra Pacific Res.	0.36
35	TECO Energy	0.52
36	TXU Corp.	0.32
37	UNITIL Corp.	0.40
38	Vectren Corp.	0.46
39	WPS Resources	0.46
40	Wisconsin Energy	0.37
41	Xcel Energy Inc.	0.33
	AVERAGE	**0.41**

Source: Value Line Investment Survey 5/2002