# Summary of Initial Review by Stephen L. Barreca

# Newfoundland & Labrador Hydro

# 2004 Capital Budget Documents

June 12, 2003

BCRI Inc. was retained by counsel for the Island Industrial Customers to review and comment on the proposed 2004 Capital Budget documents of Newfoundland & Labrador Hydro (Hydro), specifically in regards to Information Systems and Telecommunications. The objective of the review is to determine if the budget documentation contains sufficient information for a regulatory body or intervenor to determine the economic prudence of the budget proposal, and to a lesser extent, comment on the economic prudence of the major budget projects.

To date, BCRI has made an initial review of the 2004 budget submission Section A and Section B (starting on page B59) and related attachments. Additionally, BCRI has recently received Hydro's IT Technical Architecture Strategy report, dated Dec 17, 2001, however, this report is currently under review and only partially included in this summary. Due to the very tight time constraints imposed by the 2004 budget approval process, BCRI is releasing this preliminary summary at this time. We anticipate that a final summary of our findings will be issued upon completion of our review and prior to the scheduled hearing.

We recognize the difficult challenge the Board must overcome. On the one hand, it would serve no one to micro-manage Hydro, and on the other hand, the Board must meet its legislative responsibility to review and approve Hydro's capital program. In this review, I strived to avoid second-guessing Hydro's decisions and limit my comments to issues relating to the Board's responsibility for informed judgment.

## Summary of Findings

Capital expenditures for Information Systems and Telecommunications (IS&T) projects are a major portion of Hydro's 2004 capital budget. There are 12 separate projects that make up $14M (or 40%) of the $34M total capital program. Some of the 12 projects consist of several smaller related (and in some cases unrelated) capital initiatives.

In summary, I found that the project documentation (including the technical reports) does not provide sufficient detail to support independent evaluation. The projects are broadly described and principally justified via subjective argument. There is little or no objective economic analysis. For the few projects where economic analysis is given, the analysis is often suspect or lacking proper consideration of viable alternatives. For example, none of the projects included the *status quo* alternative in its economic analysis – it is common practice to include an analysis of the cost of doing nothing as the base-line alternative for all discretionary projects.

## Project Classification & Justification

The budget projects lack structure and discipline. Initiatives that have significant differences in terms of business need, safety, reliability and/or security are grouped together as a single project. This lack of structure impairs the ability to perform independent review, and makes it virtually impossible to evaluate the prudence of the expenditures. For instance, projects addressing critical security and safety concerns are combined with nonessential projects, thereby allowing safety concerns to carry potentially unnecessary expenditures. In other instances, routine-type ongoing projects are lumped with unrelated non-routine capital purchases, again allowing prudent projects to carry potentially non-prudent ones.

Nonessential spending is lumped with spending needed to support critical business functions involving safety, reliability and/or security. The biggest problem with this tactic is not one of economic prudence. The problem is that security and reliability issues are not presented in a cohesive manner conducive of proper consideration. For example, there is no project in the entire budget in respect of which one can conclude that Hydro's 2004 budget explanations adequately satisfies these crucial needs.

A second problem with this tactic is that it circumvents identification and consideration of alternatives. Critical security and reliability concerns must be separately identified, quantified, and evaluated. Without such analysis, it is impossible to determine the most cost effective way to achieve the desired reliability and security.

Everyone favors higher reliability and safety. We might all agree that it is prudent for Hydro to spend $1M if it increased reliability 10%. What if it cost $50M for a 10% improvement? In that case, if the current reliability were below norms or causing undue safety concerns, we would likely approve the project. On the other hand, if the reliability of the system were currently higher industry standards, we would likely reject the project as excessive and unnecessary.

Because essentially all major projects cite safety, reliability and security concerns as justification for the expenditure, responsibility for these concerns shifts from Hydro to the Board. With insufficient documentation regarding the implied risk, inappropriate pressure is put on the Board to approve the budget as is; otherwise the Board could be blamed if any problems were to surface.

More formal classification of budget projects would resolve these problems and enhance the budget approval process. Classifications should be kept to a minimum, but should be sufficient to support the review and approval process. A cursory survey of the capital review policies of other regulatory bodies in Canada[1] shows that most utilize some form of project classification. The most notable, to date, is that of Manitoba. The Manitoba PUB has used the following project classifications:

[1] Our research in this regard is still underway. Our findings will be made available to the Board for their consideration.

- **Essential** – projects or acquisitions are those required to meet Government regulations, environmental minimum safety standards, or which are essential to maintain operations.

- **Necessary** – projects or acquisitions are those required to maintain facilities and operations in adequate operating condition to meet anticipated activity levels. Necessary projects would include expenditures for new growth and the normal replacement of equipment that has reached the end of its useful life.

- **Justifiable –** projects or acquisitions are those that improve productivity with a new facility or the upgrade of an existing facility.

Manitoba's classifications are reasonable and consistent with those utilized in the telecommunications industry. Imposing these or similar budget classifications would improve the Board's ability to make informed judgments and mitigate the undue pressure for blanket approval discussed above.

Further improvement in the budget approval process can be achieved by establishing guidelines regarding the economic justification of budget projects.

The standard practice for economic justification is a cost benefit analysis of the viable alternatives. This is typically accomplished using a discounted cash flow model (DCF), whereby future revenues and expenditures are discounted to current dollars. For budget

purposes, it is common practice to exclude revenues that are common to all alternatives from the DCF analysis.

An alternative to a DCF analysis is simply a detailed qualitative analysis of customer value. This analysis may be limited to just a detailed narrative, or supplemented with historical trends in pertinent factors. The capital budget for emergency restoration can be fully documented based on past experience. Prior years' actual expenditures trended into the future are the only inputs required.

The type of analysis required is dependent on the nature and scope of the project, so it is useful to address this issue along the lines of the classifications presented above.

Essential Projects

These types of project are must do projects. Where the company has latitude regarding how the task is accomplished, a DCF analysis of the viable alternatives should be used. Where the dollar values are small or a DCF model is not practical, qualitative analysis may be acceptable.

Necessary Projects

By their very nature, necessary projects are often ongoing. Growth and normal replacement are likely the bulk of necessary projects, and neither requires DCF analysis for budget approval purposes. An analysis of historical expenditures and retirements along with company growth forecasts should suffice. Additionally, depreciation studies,

which most utilities do on an ongoing basis, can provide reasonable estimates of equipment life cycles and near-term replacement forecasts.

Justifiable Projects

These are projects that, while not necessary or essential to the business, add value to the business. Value can be added by improving productivity of workers, decreasing operating cost, increasing revenues, or increasing the quality of service. By their very nature, these warrant a cost benefit analysis; and because these are discretionary expenditures, a DCF analysis should be used. Qualitative justification should be allowed for only small projects or where a DCF analysis is impractical.

## Private Ownership of Telecommunications Facilities

Another area of concern is Hydro's strong desire for private ownership of all telecommunications facilities. While private ownership is not part of Hydro's vision or mission statements, the budget documents are replete with statements that clearly establish private ownership as a primary and long-term corporate objective.

Private ownership of communication facilities can be a viable means to an end; but it is not, and should not be, the objective. Like all discretionary expenditures, owning versus leasing should be based on objective analysis of the cost versus the benefits of each project.

Hydro's justification for private ownership is highly subjective. Additionally, as with most projects, communication needs that are critical to the operation and safety of the power system are lumped together with other non-critical communications needs. As submitted, it is not possible to separate the critical communications expenditures from discretionary expenditures with each project.

Hydro's justification for private ownership is based, in large measure, on their critique of common carrier networks. Hydro presents a litany of criticisms, most of which are unfounded and based on uninformed judgment. Two of the numerous criticisms are addressed below.

- Hydro claims that common carrier networks do not meet their high reliability standards. Unfortunately, the reliability statistics cited appear to be that of a typical public voice network, which is far below that of a carrier's data network and special service circuits. Additionally, examination of the reliability data provided for those communications facilities currently owned by Hydro do not appear to meet the level of reliability they claim to need.

- Hydro assumes that common carriers treat all customers and circuits the same; therefore they conclude that during a communication outage, the carrier would not give priority to restoring Hydro's critical circuits. This is

totally false. Carriers can give priority to critical circuits. In fact, carriers can monitor mission critical circuits.

Another justification for private ownership that is cited on several occasions is the generation of non-traditional revenues through the sale of excess communications capacity. Because of the limited information provided, it is not possible to determine to what extent these potential sales have influenced Hydro's communications initiatives.

Over the last five to seven years, many power companies have expanded into the telecommunications business. With shrinking rate-bases due to over-depreciation and available capital, many power companies actively sought out ways to generate non-traditional revenues. Expanding into telecommunications seemed ideal. Typically the power company began by replacing their internal networks with new facilities that were more marketable (and sized to handle more than their internal needs). With their newfound excess capacity, they entered into the telecommunications business. Some of these initiatives have proven to be marginally successful, most are losers, and the really unlucky ones have been successfully sued by ratepayers for misusing their monopoly powers.

## Review of Specific Budget Projects

The results of my review of several of Hydro's major projects are briefly summarized below. These projects are provided because they illustrate some of the concerns discussed above.

**VHF Mobile Radio System**

This project proposes to totally replace Hydro's existing mobile radio system. The existing system consists of a central switch and 29 repeater sites. The new system would replace the switch and the 29 repeater sites. Additionally, it is desirable to expand coverage of the system to several new areas. Consistent with the primary directive to own all facilities, the project moves all repeater sites not in Hydro's owned facilities to either existing or newly constructed facilities.

This project is necessary primarily because of the age of the equipment. Much of the equipment has exceeded its expected useful life and some of the equipment is manufacturer discontinued. In addition to age, several other justifications were given. These include: call privacy, private ownership, growth, mobile-data communications, switch redundancy, traffic congestion, high incidences of outages, and additional opportunity for generating non-traditional revenues from sales of communications services. As with all major projects, Hydro cites reliability, safety and security.

In addition to my review of the objective analysis, I found Hydro's subjective arguments for this project to be weak and in some cases inaccurate and misleading.

Based on the findings of Hydro's consultant, it is not imperative that this system be replaced in 2004. Consider the following observations taken from the consultant's report:

- Hydro doesn't require voice privacy
- The existing system, for the most part, has operated successfully.
- Unanticipated growth can be handled with additional repeaters on the existing network.
- The existing system is a trunking system and has the necessary features to perform telephone interface functions.
- The existing system is data capable.
- Mobile data's major application is email, requiring 2kbs.

Despite the above observations of its consultant, Hydro's proposal calls for the flash-cut replacement of the existing system. The alternatives considered include:

1. Replacing the entire system now (2004)
2. Replacing the switch now (2004), then replacing this new switch and all other equipment three years later, and
3. Replacing the switch now, then replacing this new switch and all other equipment 6 years later.

The present value of the three alternatives is summarized below:

1. $10.8M
2. $12.0M
3. $12.2M

Alternatives 2 and 3 are not rational. It is not necessary to replace the switch twice within a few short years. The cost to replace just the switch is $1.4M (2004) and is common to all of the alternatives considered. Additionally, the replacement of the remaining equipment and expanding area coverage is common to all alternatives as well. The only significant difference is the timing of the replacements.

It doesn't take an economic study to realize that, if the switch were replaced just once, Alternative 2 would be the most attractive. Alternative 3 would be very close in terms of present worth, but it delays needed replacements for too long.

A fourth alternative should be considered. It should seek the lowest cost. It should include replacing the current switch in 2004 and, given the above findings of the consultant, replacing the remaining repeaters and expanding the coverage over the following 3 to 5 years. Additionally, this alternative should not move the existing repeater sites.

Finally, a fifth alternative should be added. This alternative should be identical to Alternative 4, except that the repeater sites should be moved to company owned facilities. A comparison of Alternatives 4 and 5 would give valuable insight into the cost/benefit of private ownership in this instance. At present, we have no way to discern how much of the $10M is needed to move the repeater sites to company owned facilities.

## End User & Server Evergreen Program

This project provides for the replacement of user workstations, servers, operating systems, and PC applications. Replacements are based on a 3 to 5 year life cycle consistent with the typical equipment life cycles. This project is estimated to cost $2.8M.

The description provided for this project appears consistent with the long-term strategy detailed in Hydro's IT Technical Architecture Strategy report. It should be noted that we are still in the process of reviewing the IT report.

The long-term plan outlined in the IT report calls for the implementation of a truly state-of-the-art IT infrastructure. The plan is atypical of large utilities, and more typical of smaller high-tech companies that have intensive processing, reliability, networking, and rapid retrieval storage requirements. Having said this, for two reasons I do not have a problem with it. First, Hydro is a relatively small company. As such, the step up from modern to state-of-the-art is not overly expensive. Second, the plan lays out a "long-term" vision.

What does concern me, however, is the very high capital expenditures $2.8M, all in 2004. Considering that Hydro identifies 11 office location totaling roughly 450 office employees, the 2004 capital expenditures come to over $6,200 per office employee. You could give each office employee a state-of-the-art laptop computer with all the software for $1.35M, add 45 servers divided up between just 11 locations for $0.45M and still have $1M to spend. If we were to give 30% of the employees a thin-client device instead of the laptop, we would have $1.3M left over to spend.

The project does not provide any details regarding what the money is being spent on. It doesn't include any economic analysis (DCF) justifying the expenditure and no alternatives are considered.

## Power Line Carrier (PLC)

This project provides for the upgrading of Hydro's remaining PLC. A significant portion of Hydro's PLC systems was upgraded in 2003 and a significant portion is or will be replaced with microwave equipment as part of Hydro's high speed digital microwave system. The cost of this project is $0.4M for 2004.

No economic analysis is provided for upgrading the PLC systems, However, given that most of the PLC has already been replaced or displaced, and given the age of the equipment and the critical nature of the circuits, replacement of the PLC is warranted. My

concerns regarding PLC are not the upgrading of this equipment, but rather the shift to microwave in lieu of PLC.

The evolution of PLC technology has mirrored that of carrier technology first deployed in telecommunications network in the 1940's. Use of analog carrier in power systems began in the 1950 and has proven very effective for teleprotection and control of power systems. Even today, new generations of analog PLC systems are being introduced. However, analog PLC's days are numbered. Commercial digital PLC systems are commercially available, and significant research is devoted to improving this technology.

The shift from analog to digital represents a shift from a mature technology, where technological advancements are slow and costly to achieve, to a new technology where technological advancements are fast and accelerating. Early implementations of Broadband PLC will likely be on the market in 5 to 7 years.

Given the high potential of digital PLC technology, the shift to microware may prove to be premature.

## West-East Interconnection Microwave System

This project is described in the Telecommunication Plan but was apparently approved in the 2003 Hydro Capital Budget. It is, however, useful to review some aspects of this project which illustrate points being made in respect of current projects.

This project completes Hydro's cross-island telecommunications network by connecting the West Coast Radio system commissioned in 1999 with the East Coast Radio system commissioned in 2001. The project establishes a high-capacity (SONET OC-3, 170Mbps) radio channel between Energy Control Centre, St. John's and the Bay d'Espoir Hydro Plant. The estimated capital cost is $7,106,500.

As with most projects, justification includes Hydro's long-term objective to reduce reliance on leased facilities and cites various deficiencies in telecom carrier networks, especially Aliant Communications, in addition to reliability, safety and security. Additionally, Hydro cites generating non-traditional revenues from sales of communications services as justification for this project.

The project considered 4 alternatives, with Microwave being the least expensive.

Alternatives Considered by Hydro:

1. Aerial Fiber (ADSS)
2. Optical Ground Wire Fiber (OPGW)
3. Microwave
4. Dark Fiber Leasing

My review and analysis concludes that of the four alternatives considered, Microwave is the least expensive. This conclusion is consistent with Hydro's conclusion; however, a cheaper alternative was not pursued.

In its consideration of leasing Dark Fiber, Hydro elects to lease the needed fibers on a monthly basis for $390,000 per month. This is perhaps the most expensive way one could secure dark fibers.

For several years now, the preferred method of securing dark fiber is through an Indefeasible Right to Use (IRU) purchase contract. IRU's are structured such that the purchaser effectively owns the fiber strands and is given full access to the access points (i.e. Remote Terminal sites). The purchaser has complete control of the fiber, thus satisfying Hydro's desire to control its communication facilities. IRU prices per fiber per kilometer averaged $2,494/km[2] in the US in 2000, and prices have dropped considerably in the last two years.

Assuming comparable prices are available in Newfoundland, an IRU for four dark fibers would cost roughly $2.49M. Adding the same cost of electronics, $0.8M, yields a net of $3.3M. This alternative provides for private ownership and control, is significantly less expensivees, and provides for unlimited bandwidth.

In addition to my review of the objective analysis, I found Hydro's subjective arguments for this project to be weak and in some cases inaccurate and misleading.

---

[2] Prices shown are in Canadian dollars. Fiber IRU sale prices typically average less than 180% of the total cost to install the cable on a per strand basis. Thus, it is more economical to purchase IRU's if one only needs a few strands of fiber.

## Conclusion

The Hydro 2004 Budget Proposal does not provide sufficient documentation to support independent evaluation. The projects are principally justified via subjective arguments. In those cases where economic analysis is given, often the analysis is suspect and lacking proper consideration of viable alternatives.

The budget lacks sufficient structure, discipline and economic analysis to make intelligent judgments regarding its prudence. Private ownership and the desire to expand into the telecommunications business may have unduly influenced the nature and scope of Hydro's capital program.

The structure of the current budget, its lack of detailed economic analysis of viable alternatives and its over-reliance on security, safety and reliability as justification for approval unduly shifts responsibility in these crucial areas from Hydro to the regulators.

Approval comes down to the cost of the expenditure versus the benefit to be gained. The proposed 2004 Capital Budget does not provide the details or the structure to allow one to make an intelligent judgment in this regard. The Board should consider adopting project

classifications similar to those discussed in this review, and possibly impose guidelines governing the nature and scope of the project justification.

Respectfully Submitted

Stephen L. Barreca

BCRI Inc.