1	Q.	In the Board's Decision for P.U.7 (No. 68), the Board directed NLH to review
2		the existing lifeline block for domestic customers to assess its adequacy.
3		Please provide a copy of this review.
4		
5		

6 A. See attached report.

CA-13 NLH Attachment



A REVIEW OF THE ADEQUACY OF THE LIFELINE BLOCK ON DIESEL ELECTRIC SYSTEMS

Newfoundland and Labrador Hydro December 2002 & Appendix March 2003

Table of Contents

Introduction1
The Purpose of the Lifeline Block 1
The Lifeline and Domestic Diesel Customer Consumption 2
Diesel Household Survey
Electricity Consumption Versus the Lifeline
Labrador Versus Island Diesel Consumption
Customer Weights
Assessing the Adequacy of the Lifeline
An Alternative Domestic Diesel Lifeline
Revenue Impacts and the Rural Deficit9
Summary9

Introduction

The Public Utilities Board (The Board) in Order No. P.U. 7 (2002-2003) June 7, 2002 directed Newfoundland and Labrador Hydro (NLH) to "...file with the Board on or before December 31, 2002, a report in respect of the "*lifeline block*" for domestic isolated rural customer to assess its adequacy." NLH has prepared this review of the domestic lifeline block in response to that Order.

The Purpose of the Lifeline Block

The generally accepted purpose of the lifeline block is to provide domestic households located on diesel systems with access to electricity at non-discriminatory prices for essential, non-substitutable end-use requirements. The initial Order in Council 184-'74 set the lifeline block at 500 kWhs per month effective March 1, 1974. Effective on April 1, 1987, Order in Council 520-'87 increased the lifeline block from 500 to 600 kWhs per month. Order in Council 810-'89 further increased the lifeline block from 600 to 700 kWhs per month on July 1, 1989, where it now stands.¹

The Board has expressed its own views on the purpose of the lifeline block on previous occasions. For example, in its April 27, 1979 report on the Power Distribution District (page 141), the Board stated that "(it) is of the opinion that 500 kWhs per month is sufficient to permit the use of most of the basic electrical appliances but not water heating and space heating." More recently in its July 29,1996 Rural Electrical Service report (page 31), the Board commented that the "…the current lifeline rate of 700 kWh per month provides domestic customers with sufficient energy to supply all lighting and appliances and up to 85% of their electric hot water heating requirements."

^{1.} In terms of pricing, this 700 kWh block is priced at the Newfoundland Power Island interconnected domestic rate. Beyond 700 kWhs per month, the price increases for diesel domestic customers in two steps. For the second block, from 701 to 1,000 kWhs, the current rate is \$0.09864 per kWh. The third block, above 1,000 kWhs per month, is currently priced at \$13.372 per kWh.

NLH believes the issue of evaluating, in current times, the adequacy of the 700 kWh lifeline rate should include consideration of the following three questions:

- Whether the electric hot water heater appliance should now be considered as part of the essential household electricity services which the lifeline was intended to provide;
- 2. Whether the lifeline should reflect some seasonality of household electricity requirements; and,
- 3. Whether the lifeline should address regional variation in household electricity consumption.

The Lifeline and Domestic Diesel Customer Consumption

Figure 1 places the lifeline block in the context of historical average monthly consumption on the diesel systems. The domestic consumption account data represent the annual average statistics available from NLH billing systems expressed on a monthly basis.



Over the last 25 years, average domestic electricity consumption on the diesel systems has almost doubled, increasing from 380 kWh to 740 kWh per month. While this increase over time can be

attributed to the growing saturation of basic appliances, the uptake of electric hot water heaters throughout the Province has been a key element. Statistics Canada data indicates that in 1975 electricity was used for water heating in 43% of the households in the Province. By 1989 this market share for electricity had increased to 82%, and more recently in 2000, electricity's market share for hot water heating was 85% of all households in the Province².

Diesel Household Survey

In 1992, and again in 2001, NLH undertook a comprehensive household survey across the diesel systems in order to better understand customer facilities and equipment as it relates to electricity consumption³. The resulting databases were then linked to the respondents' electricity billing records for the previous twelve months, therein providing a useful statistical database for analysing and understanding customer electricity consumption levels and patterns. An important aspect of this data is that it provides a customer-based perspective into the issue of the lifeline rate.

The surveys indicated that diesel households were not unlike interconnected customers with respect to their general stock of appliances and typical end-use demands. By contrast, unlike other regions of the Province, electric heat had a low market share owing to the diesel rate structure. The surveys indicated that less than 10% of households use electricity for their main heat sources in contrast to about 50% of households for the Province overall⁴. For hot water heating, electricity held the major market share. Across diesel systems in 1992, 77% of households used electricity for hot water heating⁵ and by 2001 this market share had increased to 84 % of households. Since the addition of the electric hot water heater into a home can double basic household electricity use, consumption profiles for households with and without electric hot water have to be reviewed in order to appreciate electricity use from the customers' perspective.

^{2.} Provincial market share data as per Statistics Canada 64-202 and replacement Survey of Household Spending.

^{3.} Survey of Households Located in Diesel Electric Systems in the Province of Newfoundland, NLH November 1992 and Survey of Households Located in Newfoundland and Labrador Hydro Service Territory, NLH Interim Report September 2001.

^{4.} Provincial space heating market share as per Statistics Canada: Survey of Household Spending in 2000

^{5.} Excludes St. Anthony and L'Anse au Loup for comparability.

Electricity Consumption Versus the Lifeline

The survey database for 2001 was used to profile monthly household electricity consumption levels and patterns. Based on the survey response data, and after screening for electric heating, diesel households were first categorized according to whether or not the home used electricity for hot water heating.

Figure 2 shows average consumption by month for the total diesel system against the lifeline rate, and according to whether a household uses electricity for water heating.



So long as electricity is not used for water heating, the lifeline would appear to continue to provide more than a reasonable basic provision for essential electricity services. In addition, electricity consumption is seasonal regardless of hot water heating source and the constant lifeline across the year is not well matched against the actual seasonal electricity use patterns. The seasonality associated with basic electricity use means that those homes with an electric hot water are into at least the second block for about three quarters of the year. These observations are the same as those made from the earlier 1992 diesel household survey.

Labrador Versus Island Diesel Consumption

Electricity consumption on diesel systems can be further distinguished on the basis of geographic location. Figure 3 indicates that average household electricity consumption is higher in Labrador than on the Island. This should be expected for Labrador because of greater heating degree-days,



greater lighting requirements during winter months, demographic differences such as larger and younger families, etc. For households with electric water heating, NLH survey analysis indicates that Labrador consumption across the year was about 20 % higher than on the Island.

Customer Weights

Historically, the lifeline did not take into consideration changing domestic customer weights by region. However, the interconnection of a number of Island diesel systems over the years has resulted in Labrador now having a larger share of the domestic diesel customer base being serviced. As recently as 1995, Island diesel customers made up almost 65 percent of the domestic diesel customer pool and Labrador just over 35 percent. By contrast, in 2001, this proportion had been essentially reversed - the Island diesel customers accounted for just over 30 percent of domestic diesel accounts, with Labrador isolated systems now making up almost 70 percent. Moving forward, this weighting is expected to further increase in favour of Labrador systems due to higher customer growth relative to the Island diesel systems. The characteristics of electricity consumption in Labrador diesel systems will continue to be prominently reflected in domestic diesel consumption statistics and considerations.

Assessing the Adequacy of the Lifeline

A summary of NLH survey data indicates that the majority of diesel households would have electricity consumption in excess of the existing lifeline block of 700 kWhs per month. This arises for three key reasons. First, electric hot water heating has increased its market share and is now present in over 80 percent of diesel households. On an annual basis, households with electric water heating will consume about 15 percent more than the lifeline provides for. Second, electricity consumption naturally increases as the months of the year become darker and colder and indoor activities increase. The presence of electric water heating compounds the issue of seasonality – during the peak winter months a household with electric hot water heating will be consuming, on average, 35-40 % more electricity than the lifeline block. And thirdly, from a regional perspective, Labrador diesel households with electric water heating tend to have higher consumption than on the Island owing to environmental and demographic factors. Following numerous Island interconnections, Labrador domestic customers now represent the dominant statistical weight.

In light of the above, NLH believes it is appropriate that the following questions be considered in evaluating whether an alternative lifeline block should be implemented for the isolated diesel systems:

- 1. Should the lifeline block now be explicitly defined to include provision for an average household's electric hot water heating?
- 2. Should the lifeline block be seasonal to reflect the varying basic household electricity consumption requirements across any given year?
- 3. What impact will changes to the lifeline block have on the rural deficit?

An Alternative Domestic Diesel Lifeline

Based on a review of recent household billing data as contained in Figures 2 & 3, which matches very closely results obtained in the 1992 survey, NLH believes the following seasonal lifeline would be representative of an appropriate, alternative lifeline block for provincial diesel systems should a single seasonal lifeline incorporating electric hot water be implemented⁶.

Alternative Lifelines for NLH Diesel Systems								
		Alternative Seasonal						
Month	Existing Lifeline	Lifeline						
WOIth	(kWh)	Including Hot Water						
		(kWh)						
January	700	1,000						
February	700	1,000						
March	700	900						
April	700	900						
May	700	800						
June	700	800						
July	700	700						
August	700	700						
September	700	700						
October	700	800						
November	700	900						
December	700	1,000						
Total kWh	8,400	10,200						
Monthly Average kWh	700	850						

^{6.} If a seasonal lifeline were to be considered, NLH would suggest that a single seasonal lifeline block should continue to prevail for all diesel systems, both Island and Labrador, for consideration of administrative ease and customer equity.

Revenue Impacts and the Rural Deficit

NLH supports the continuation of an inverted rate structure for domestic customers on the diesel systems. This rate structure ensures that appropriate price signals are conveyed to customers regarding the cost to the economy of utilizing electricity for space heating when power is sourced to diesel generation systems. History demonstrates that this rate structure has been an effective load management mechanism on the diesel systems thus minimizing the rural deficit.

Using billing frequency analysis, NLH has calculated the marginal loss in domestic diesel revenue associated with an alternative lifeline block as outlined above. It's important to note that the marginal revenue loss, where applicable in any given month, is the net of the first and second block pricing. Thus the illustrated revenue loss for kWhs in the second block is \$0.09864 minus \$0.06951, or \$0.02913 per kWh. Pricing in the third domestic block for all kWhs above 1,000 per month of \$0.13372 per kWh would be unaffected.

Utilizing the recent 2002 NLH Cost of Service framework, and the current domestic diesel rate structure, the impact of the alternative seasonal lifeline block would be to reduce rural domestic diesel revenue by \$66,000 per year. This represents a 2.6% decrease in domestic diesel revenue and a 1.0% decrease to total diesel system revenue. The amount of the rural deficit would increase by the revenue loss. At \$66,000, the 2002 Cost of Service rural deficit would increase by 0.25% should a seasonal lifeline as outlined be implemented.

Summary

A review of diesel household survey and consumption data indicates that there is some merit to consider a change in the existing lifeline block owing to the continued rise in the market share for electric hot water heating, seasonal electricity use patterns, and the prominence of diesel customers located on Labrador diesel systems. Changes in the lifeline block will impact upon the rural deficit. An alternative domestic lifeline was reviewed for the information and consideration of the Board and found to result in an increase in the rural deficit of \$66,000 per year.

<u>APPENDIX</u>

Introduction

On December 5, 2002, Newfoundland and Labrador NLH (NLH) filed a report on the Adequacy of the Lifeline Block on Diesel Electric Systems (the "Report") with the Board of Commissioners of Public Utilities (the Board) in response to a direction contained in Order No. P.U. 7 (2002-2003) that NLH file a report, by December 31, 2002, in respect of the lifeline block for domestic isolated rural customers to assess its adequacy. Subsequently, NLH received a letter dated January 31, 2003, from Robert Byrne, Director of Regulatory and Advisory Services for the Board, requesting that additional information be provided with respect to the lifeline block. This Appendix sets out the additional information requested in the letter of January 31, 2003.

1. <u>The development of the lifeline block</u>

NLH was requested to provide additional information on "A history of the development of the lifeline block, in terms of kWh level and rates, and the reasons for the changes as they occurred".

As stated in page 1 of the Report, Order-in-Council 184-'74 initially set the lifeline block at 500 kWh per month effective March 1, 1974. Effective April 1, 1987, Order-in-Council 520-'87 increased the lifeline block from 500 to 600 kWh per month. Order-in-Council 810-'89 further increased the lifeline block from 600 to 700 kWh per month on July 1, 1989, which is the current level for the lifeline block.

Neither NLH's applications for approval to the Board in 1987 and 1989. nor the Board's Orders approving NLH's applications to increase the lifeline block, provided an explanation or rationale for the increase that was sought by NLH and approved by the Board on each of these occasions. It is interesting to note that both the change to 600 kWh in 1987 and the change to 700 kWh in 1989 had been announced by the Provincial Government in its Budget Speech of that year prior to NLH's application to the Board for approval for the change. While NLH's applications for approval of the changes, as well as the Board's orders approving the changes, do not provide reasons for the increase in the lifeline block in 1987 and 1989, it is understood that the generally accepted purpose of the lifeline block, as stated on page 1 of the Report, is to provide domestic households located on diesel systems with access to electricity at nondiscriminatory prices for essential, non-substitutable end use requirements. The comments of the Board with respect to the purpose of the lifeline block in 1979 and 1996 are provided on page 1 of the Report. As stated on page 2 of the Report, one of the questions that now arises is whether the electric hot water heater appliance should be considered as part of essential household electricity services.

The table below sets out the rates that were in effect immediately prior to and after the increase from 500 to 600 kWh per month for the lifeline block in 1987 and the further increase from 600 to 700 kWh per month in 1989.

Lifeline Block	Date	Year	Basic Charge		KWh	\$/kWh
500	Jan 1	1986	\$10.00	1 ^{s⊤} Next Over	500 500 1000	0.06101 0.08680 0.11760
600	July 1	1987	\$10.00	1 st Next Over	600 400 1000	0.05994 0.08680 0.11760
600	July 1	1988	\$10.35	1 st Next Over	600 400 1000	0.06055 0.08860 0.12010
700	July 1	1989	\$10.35	1 st Next Over	700 300 1000	0.05744 0.08860 0.12010

<u>LIFELINE BLOCK RATES – DOMESTIC</u>

2. <u>The use of lifeline blocks in other jurisdictions.</u>

NLH was requested to provide information on "A comparison with the use and growth of lifeline blocks in other jurisdictions".

The current information NLH has available with respect to the use of lifeline blocks in other jurisdictions arises from a survey conducted by Manitoba Hydro in 2001 in which BC Hydro, Hydro Quebec, Manitoba Hydro, Yukon Electrical, Northwest Territories Power, Hydro One, ATCO and NLH participated. This survey disclosed that a lifeline block is common in other jurisdictions where remote isolated areas are served by diesel generation. The size of the lifeline block and the value of the rates charged for consumption in excess of the lifeline block vary in each jurisdiction. The following is a summary of the practice in other jurisdictions as disclosed in the survey:

- <u>Hydro Quebec</u> residential customers receive the first 900 kWh per month at the same rates as residential customers served from the interconnected grid with the rates for consumption above this level being 26.5¢ per kWh.
- <u>ATCO</u> customers in all isolated communities are served on the same rates as interconnected customers.
- <u>Manitoba Hydro</u> residential customers are limited to a 60-amp service or less and pay the same rates as customers served from the interconnected grid. General service non-government customers pay interconnected rates on the first 3000 kWh per month and a full cost rate of 35.9¢ on consumption in excess of this level.
- Northwest Territories Power residential customers pay the same rates as customers served from the grid for the first 700 kWh per month. Consumption above this level is charged at rates designed to recover full cost. A small number of qualified general service customers who apply for a Territorial Support Program receive up to 1000 kWh per month at the grid rates, with additional consumption being charged a rate designed to recover full costs.
- <u>B. C. Hydro</u> residential customers pay the same rate as customers served on the interconnected grid for the first 1500 kWh per month and 9.91¢ per kWh for consumption above this level. General service customers less than 35 kW pay interconnected rates on the first 7000 kWh per month, while general service customers greater than 35 kW pay interconnected rates for the first 200 kWh per kW per month. All consumption in excess of these levels for general service customers is billed at 10.8¢ per kWh.

<u>Yukon Electrical</u> - residential customers pay the same rates as customers served from the interconnected grid for the first 1000 kWh per month while general service customers pay the interconnected rates for the first 2000 kWh per month.
Consumption above these levels for all customers varies from 10.45¢ to 33.56¢ per kWh.

NLH has no information available with respect to the growth or any change in the lifeline blocks in these jurisdictions over time.

3. The substitutability of electric hot water heating for other means

NLH was requested to provide "A discussion of the substitutability of electric hot water heating for other means, and its applicability to the development of a lifeline block".

The electric water heater has enjoyed widespread uptake and consumer acceptance throughout the entire Province of Newfoundland and Labrador and NLH's diesel areas are no exception. The growth in electric water heating loads, on isolated systems and elsewhere, has been facilitated to a considerable degree by Government water and sewer infrastructure investments in recent decades. Today, and consistent with the entire Province, about 85% of households located in NLH's diesel areas have an electric hot water heater installed. (Oil has less than a 10% water heating market share on diesel systems and propane has negligible water heating market share.)

In theory, all energy fuels available to consumers, e.g., electricity, oil, propane, or wood, can be utilized to provide domestic hot water. In more practical terms, electric and fuel oil hot water heaters are the primary competitive sources for this household requirement in rural areas the Province. While

Page 6 of 10

considerations of overall energy efficiency and hot water quantity can sometimes favour oil fired water heating, it faces a number of major market barriers that have now resulted in oil having a very small and declining market share of the domestic water heating market in the Province. For example, the capital cost of oil-fired domestic hot water system is very high, not just for the heater unit but also for the fuel handling system, ventilation etc. since most households do not already rely on fuel oil for space heating. By contrast, the capital cost for electric hot water is very low, and the appliance is both convenient and essentially trouble free to install, maintain and operate.

In order to substitute electric hot water heating across diesel systems, NLH would have to fully fund the retrofit conversion of some 3,000 water heaters at a cost per unit in the order of \$1,500 to \$3,000 per household depending on whether oil-fired space heating equipment was already present in a home. This clearly would be a significant undertaking with no guarantees of customer acceptance or success. Based on earlier survey data, NLH would expect that only a minority of customers would consider hot water fuel switching if there was little or no cost. Moreover, the financial savings for NLH would be limited to diesel fuel costs net of forgone revenue, and thus there is a high likelihood that a electric water heating substitution venture would in fact increase the rural deficit owing to the capital cost of the program. The same analytical process would follow for water heating or electric cooking range substitution using propane equipment and fuel. Substitution considerations have an additional constraint due to the limited commercial service and support networks for alternative alternatives fuels and applications as required for electricity substitution.

During the early 1990's NLH implemented an incentive fuel substitution program for hot water heating on the diesel systems. Outside of the then diesel St. Anthony area, the program essentially received no customer acceptance, despite a significant \$500 program incentive. Issues of convenience and service networks are among the factors considered to have restricted the success of the fuel substitution effort.

Despite its initial apparent potential, NLH does not consider electric hot water fuel substitution to be a practical or cost effective avenue across all diesel systems for addressing issues pertaining customer electricity consumption levels, lifelines blocks and rural deficits.

If fuel substitution were a practical means for reducing electricity consumption across diesel systems, it would have an impact upon the development of a lifeline block. A one hundred percent conversion of electric water heating in diesel areas to alternative fuels would facilitate a reduction in the lifeline block back to the 500 kWh per month area as indicated in NLH's customer billing records for households without electric hot water today. Seasonal consumption issues remain with an expected consumption level of 450-500 kWhs per month in the summertime, increasing to 650-700 kWhs per month in the wintertime.

4. <u>The future long-term effect on the use and growth of electric hot</u> water heating of an increase in the lifeline block.

NLH was requested to provide "A discussion on the future long-term effect on the use and growth of electric hot water heating, and therefore of the level of the rural deficit, of an increase in the lifeline block".

The market share for electric hot water on most diesel systems is at, or nearing, its saturation point. Thus, growth in market share for electric water heating in the future would not be a material source of financial loss causing an increasing rural deficit going forward. Increasing the lifeline block will reduce revenue to NLH, and by definition this will increase the rural deficit. (This is presented in detail on page 9 of the Report)

Page 8 of 10

The rural deficit is a function of fixed and variable costs against revenues at any given point in time. What the present high market share for electric hot water, and its use, does do, is maintain a positive or negative contribution to the annual deficit depending on the short run marginal cost of diesel fuel for the diesel systems. For example during 2002, NLH's average diesel fuel cost was about \$0.42 per litre, that at an average efficiency of 3.3 kWh per litre, resulted in a short run marginal cost of approximately \$0.127 per kWh. The marginal revenue that NLH derives from electricity used for water heating is essentially an average of the first and second blocks of the domestic diesel rate structure, and in 2002, electric water heating was recovering about 65% of NLH's short run marginal costs. By contrast, for the period 1992 to 1999 NLH's diesel fuel costs averaged \$0.24 per litre and therefore, during this entire period, electric water heating load on diesel systems largely recovered its short run marginal costs and made a positive contribution to fixed costs owing to the low fuel prices against the prevailing diesel rate structure.

Increasing the lifeline block will not cause a surge in electricity consumption related to water heating largely due to the existing high market saturation level. Moreover, water heating is not observed to be a variable demand dependent upon price signals. Notwithstanding this, it is possible for there to be latent impacts arising from any increase in the lifeline block. This has some limited potential to occur since from the customer's perspective, the average price of electricity would have become cheaper and the monthly bill would have been reduced relative to what it would otherwise have been. Thus there may be some inclination to consume more, and diesel system load growth, if taken to the extreme, could result in an increase in the rural deficit. However, NLH believes that is not a material concern in this circumstance. For example, bill savings are modest in dollar terms and consumers have obvious choices of how to utilize such modest savings. However, the more important reason why NLH does not believe that an increase in the lifeline block would trigger load growth and increase the deficit, relates to the continuation of the critical marginal price signal contained in the third pricing tier for domestic diesel customers. It is the maintenance of this marginal price signal that will continue to effectively limit load growth and manage the rural deficit to the extent practical with the current rate structure on the diesel systems.

5. <u>The overall long-term effect of maintaining the status quo with</u> regard to the lifeline block.

NLH was requested to provide "A discussion on the overall long-term effect, on the lives of consumers and on the level of the rural deficit, of maintaining the status quo with regard to the lifeline block".

The existing lifeline is poorly matched against the actual household electricity consumption levels and annual pattern of use for the majority of diesel consumers as set out on pages 4-6 of the Report. NLH has a strong price signal in place regarding electric heat that has been very effective and appears to be largely understood and accepted by diesel consumers. Everything that is not electric heat is taken to be basic household use and it is the pricing for these services that lies at the heart of the consumer complaints that arose during NLH's 2001 rate referral. These complaints gave rise to the Board's request for a review of the adequacy of the lifeline block.

Maintaining the status quo with respect to the lifeline block will neither increase nor decrease the rural deficit over what it would otherwise be, but it may negatively impact customer satisfaction.

6. <u>The overall long-term effect of decreasing the lifeline block.</u>

NLH was requested to provide "A discussion on the overall long-term effect, on the lives of consumers and on the level of the rural deficit, of decreasing the lifeline block".

The long-term effect on the lives of diesel consumers from decreasing the lifeline is to reduce their economic welfare with higher average electricity prices and corresponding lower personal disposable income per household. This situation exacerbates negative customer service perceptions already existing in the diesel areas.

Decreasing the lifeline block will, by definition, make a marginal contribution to reducing the deficit.