Q. Section 5 of the "Report on a Task Force Review of Operational and Financial Initiatives on Hydro's Isolated Diesel Systems" dated December 1993 provided initiatives to be undertaken and an implementation date for each initiative. Please provide a discussion of each initiative identifying the implementation date for each initiative and the annual savings that resulted from each initiative. If any of the initiatives were not implemented, please explain why not.

A. In March 1995, Hydro completed the "Isolated Diesel Systems Task Force Status Report" which was an update to the original report and was filed at the 1995 Rural Rate Inquiry. A copy of the Status report is attached. Hydro has not undertaken a further update to this report; however, Hydro continues to investigate opportunities for cost reduction in rural areas. Some examples of these initiatives are discussed in the Corporate Overview: Evidence, Page 25, Section 6., Rural Deficit and the Transmission & Rural Operations: Evidence, Section 3. Also see Hydro's response to NP-55 NLH.

NEWFOUNDLAND AND LABRADOR HYDRO

ISOLATED DIESEL SYSTEMS

TASK FORCE STATUS REPORT

A TASK FORCE REVIEW OF
OPERATIONAL AND FINANCIAL INITIATIVES TO
REDUCE FINANCIAL LOSSES ON
NEWFOUNDLAND AND LABRADOR HYDRO'S
ISOLATED DIESEL SYSTEMS.

March 1995

1 INTRODUCTION

At the close of 1992 the isolated rural electrical distribution system of the Province of Newfoundland and Labrador served thirty-one individual rural systems. The plants which serve these communities are, generally, diesel engine powered. They range in size from 90 kilowatts in Norman Bay, a community with only 18 customers to 19,600 kilowatts in the St. Anthony-Roddickton area, with 3829 customers. Hydro also has a 400 kilowatt hydro plant and one 5 megawatt Thermal plant. In 1992 the net financial deficit incurred by these systems was over $24 million.

In February 1993 the Hydro Management Committee appointed a Steering Committee to investigate financial losses on the isolated rural electrical system. The following Management representatives were appointed to the Steering Committee:

* Vice President of Operations,
* Vice President of Engineering and Corporate Services,
* Vice President of Corporate Planning and
* Vice President of Finance.

The Steering Committee set up a Task Force with representatives from Systems Planning, Engineering Design, Transmission and Rural Operations, Economic Analysis, Controller's Department, Rates and Financial Planning and Operations. The Task Force was given the following mandate:

> *"Review the complete scope of Hydro's operations on the thirty-one (31) isolated diesel systems, i.e. the generation, the distribution and the utilization of electricity, to identify cost-effective measures which could be implemented by Hydro to reduce financial losses on these systems."*

A report was published internally, by the Task Force, in December 1993 which gave a description of the isolated diesel systems as they were on the 31st. December 1992 and included detail on production, sales, customers, costs and revenues. The Task Force reviewed and analyzed this information and identified a number of deficit reduction initiatives. Where possible, the priority and financial benefit was provided of each initiative.

In its original report on Deficit Reduction the Task Force identified three major areas for study and investigation, viz:

* reduction in output,

* reduction in costs, and

* increases in revenue.

With the approval and backing of the Steering Committee, many of the Task Force's Recommendations received immediate response. Departments appointed by the Steering Committee to investigate the recommendations individually and in more detail have reported their findings. These findings have influenced the importance of many of the initiatives.

This Status Report is to update the findings of the original report, provide a review of progress made to date on reducing the financial deficit, and, where necessary, revise the priorities and initiatives contained in the original report, in the light of current knowledge.

2 PROGRESS SINCE 1993

2.1 DIESEL SYSTEMS UPDATE

At the end of 1992 there were thirty-four (34) plants, serving thirty-one (31) isolated electrical distribution systems. The interconnection of Petite Forte in September 1993 reduced this total to thirty (30) and the imminent interconnection of the Roddickton-St. Anthony area, due in 1996 will reduce the total number of separate systems to twenty-nine (29). Altogether the total number of customers will be reduced by approximately 46% to 3,800 and isolated diesel systems electricity production will be reduced by approximately 50%, or over 45 GWhrs.

In the last two years, 1993 and 1994, and excluding the St. Anthony-Roddickton system, there has been an increase of 120 customers. Also in the remaining twenty nine systems there has been load growth in both years, 1.4% in 1993 and 0.7% in 1994 despite a decline in the Ramea system of 11.4% in 1994 due to the closure of the fish plant.

2.2 CONSERVATION

The objective for diesel electricity conservation is to assist in an overall corporate effort to ensure that economic losses are minimized in the provision of electrical service on isolated rural systems. Conservation and load management are the broad means through which to control and reduce customer demand and utility output. However, whether or not conservation of electricity on diesel systems leads to a reduction in utility costs is a different question than whether conservation leads to a reduction in the deficit.

2.2.1 Demand Side Management (DSM)

(a) Diesel DSM Pilot Projects

In 1993 Hydro initiated two pilot diesel DSM projects in order to gain experience with DSM products, services and delivery and, in addition, to test the actual technical and economic effectiveness of DSM as a utility sponsored resource. On the Charlottetown diesel system a community based conservation DSM effort was undertaken.[1] The end result of this conservation oriented project has been about a ten percent reduction in customer energy and power demand, based on an interim evaluation.[2]

The utility resource cost for the Charlottetown type of DSM project is about $.05/kWh. While this is less than short run diesel fuel costs, revenue loss will exceed this utility cost. When the economic credits afforded to DSM are only displaced diesel fuel (i.e. the system is not capacity constrained and in need of generation expansion), diesel DSM, as delivered on the Charlottetown system, will increase the deficit through the medium term. DSM would increase the deficit since the revenue otherwise received from the sale of electricity to customers would more than have covered short run production costs (i.e. diesel fuel). So even though DSM costs less than the utility's production costs, and system load is lower, the absolute level of the deficit can be larger with DSM. Notwithstanding, the positive result of this pilot project is that the utility can reduce and mitigate load growth on diesel systems through DSM in a favourable manner. The scope of this pilot project was repeated in 1994 for the Francois diesel system on the Province's south coast.[3] In this community diesel fuel costs are significantly higher than customer revenue and so conservation DSM here will decrease the deficit on the margin. Hydro

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[1]For a description see "DSM Program for Diesel Electric Systems", March ,1994. Final Report by Barakat & Chamberlin to NLH.

[2] For particulars see "Charlottetown DSM Pilot Project, Analysis and Evaluation" NLH, December 1994. DSM savings are assumed to remain largely durable for a ten year period.

[3]Hydro has also carried out less comprehensive DSM efforts on the two small, high fuel production cost diesel systems at Norman Bay and Mud Lake.

will monitor and continue to work with customers in these diesel systems in order to evaluate the ongoing benefits and costs of conservation oriented DSM on diesel systems. No further community DSM work is planned in the near term.

The second pilot DSM program which Hydro undertook in 1993/94 was an incentive based electric hot water fuel substitution program for diesel systems. This initiative was started in recognition that electric hot water is the single largest end use residential demand for diesel customers. Mitigating electricity demand on diesel systems overall entails having more control or influence in the hot water end use market. Thus the intent of this pilot program was to test the development of an oil based hot water market across the entire diesel system by providing an attractive incentive for customers and a business opportunity for oil companies.

Some forty-seven customers participated in the program and, based on an interim analysis, provide demand and energy savings of 60 kW and 221 MWh annually. The utility resource cost for this program was about $.02/kWh.[4] However, a number of problems surfaced for the water heater program, not the least of which was that the operation of the program was largely limited to the low cost St. Anthony diesel system despite having been offered to all diesel systems. Fuel substitution cannot compete with fuel displacement where revenue loss, in the short run, makes such utility market activity uneconomic. Fuel substitution requires consideration of long run marginal costs of electricity supply to be cost effective in the context of the utility rural deficit reduction goal.

(b) Revised Scope of Diesel DSM

Hydro's initial reviews of economic opportunities for DSM on diesel systems[5] indicated that system wide opportunities for conservation oriented DSM were present since the short run marginal costs were calculated to be greater than revenue received. These short run

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[4]For particulars see "A Review of the Energy Wise Water Heater Program", NLH December 1994.

[5] Carried out in 1991/1992 and referenced in Task Force report, page 4.4-4.5.

marginal costs consisted of diesel fuel costs plus operation and maintenance costs (excluding labour). Following the DSM pilot projects outlined above, and continued internal assessment, it was concluded that O&M expenses related to existing diesel plant could not reliably be considered a variable cost of production. The reason is that DSM impacts, arising from conventional DSM programs as envisioned for the diesel systems, could not reduce system loads enough to defer or avoid the maintenance expenditures normally scheduled according to standard utility practise.

To ensure a prudent application of DSM in the short term towards the reduction of the rural deficit, Hydro now believes that decisions as to the system wide application of diesel DSM should be based on whether or not conservation can cost-effectively displace diesel fuel only. Under present circumstances average revenue essentially covers Hydro's diesel fuel costs for domestic loads across diesel systems. Revenue loss is the pervasive constraint for DSM in the short run. The potential of DSM to reduce the financial loss and corresponding overall deficit in the short term would seem limited.[6]

The contrasting consideration for DSM is where a specific diesel system requires capital spending on additional generation capacity and related investments to meet projected load. In this situation the marginal cost credit for DSM will reflect a combination of avoided fuel, O&M, and capital charges. Such credits are specific to a particular system as will be DSM opportunities targeting capital deferral.[7]

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[6]Changes in the relationship between short run marginal costs and marginal revenue could lead to cost effective conservation oriented DSM. Such changes could be 1) a decrease in the marginal revenue received on diesel systems and 2) sustained rise in diesel fuel prices without subsequent rate relief.

The interplay of cost and revenue considerations actually requires the utility to evaluate diesel systems on an individual basis.

[7]It should be noted that the majority of diesel systems are not capacity constrained through a medium term ten year planning period.

An important element of DSM in the situation of capital deferral or elimination will be the mitigation of system peak demand. In 1995 Hydro is planning to proceed with a load management pilot on a diesel system targeting the electric hot water appliance which has high saturation amongst households on diesel systems in the Province. The load management pilot will be an important component in Hydro's understanding of the opportunities and constraints of undertaking DSM on the isolated diesel systems.

(c) Diesel DSM and Least Cost Planning

DSM competes as a utility resource against traditional supply side resources for providing existing and expected energy requirements on any given diesel system. Where DSM, in its many forms, can achieve the resource requirements at a lower cost than adding capital, then DSM will be preferred since it will minimize the revenue requirement of customers. The view here is that the utility has an inventory of resources capable of providing the energy resources driven by new load growth - it can buy a generator, it can buy efficiency, it can buy diversity etc. When additional energy resource capability is required for a diesel system, least cost planning requires this broader view of utility options and Hydro does ensure that DSM is included in least cost planning. Hydro accepts the responsibility of continuing with diesel DSM pilot efforts, notably load management, to properly identify the opportunities and constraints for this resource. Lower cost DSM alternatives to load driven capital requirements, where feasible and appropriate, will ensure a minimization of the deficit in future periods.

2.2.2 Customer Education

An overall deficit reduction initiative would not be complete without involving customers. Educating customers in the efficient use of electrical energy can benefit both the consumer and the utility. Hydro distributes information to customers on energy efficiency through a customer newsletter, and through free publications. In late 1994 Hydro joined Power Smart, a national, member based, organization which promotes energy efficiency through programs, customer communications and product endorsement. Power Smart gives Hydro access to a wide variety of opportunities for increasing the value of its services to customers.

2.2.3 Street and Area Lighting

Hydro is continuing the program of replacing mercury vapour streetlights with the more efficient high pressure sodium lights. At the end of 1994 this program was approximately 90% complete in isolated diesel areas. With the exception of some outdoor arenas, where mercury vapour lighting is preferred, this program will continue.

2.2.4 Reducing Losses

The original report identified the need to examine individual diesel system losses with the intent of reducing these losses and thus improving overall efficiencies. A number of steps have been taken to meet this initiative.

(a) Reporting Losses

In order to establish true values for losses and station service a program to identify metering and reporting discrepancies was initiated. To date production metering in eighteen (18) plants has been recalibrated to the same standard as point-of-sale meters. Metering at other plants will be recalibrated as part of normal plant maintenance activities. In some areas electronic recording equipment with remote access is being installed.

(b) Station Service

Hydro's revenues are based on sales to customers. Station service load is a parasitic load which increases costs and reduces the amount of power available for sale. It is generally true that Hydro can invest in initiatives which reduce station service so long as their costs are less than diesel production costs. Several means of reducing the station service load are available:

i Electric Motors - High efficiency motors used for fan, pump and compressor drives which may reduce the power consumption of such auxiliary equipment by 3% to 8% are now being specified on all equipment purchased for new diesel plants and on all replacement equipment ordered for existing plants.

ii Variable Speed Drives - The Task Force identified that considerable energy savings could be realized through the use of variable speed drives and as a result all new diesel plants are being equipped with variable speed radiator fan motors. Additionally it has been found to be cost effective to equip new plants with two large radiators (one normal service radiator equipped with a variable speed fan and the other a back-up unit equipped with a single speed fan), rather than equipping each generating set with its own radiator and variable speed fan.

iii Space Heating - Studies have indicated that heat recovery systems can, in some cases, be more economic than either oil furnace or electric heat systems, especially when combined with a single plant radiator, as described above. Each case is being evaluated separately. To date the new plants constructed at Hopedale, Mary's Harbour and Port Hope Simpson have been fitted with heat recovery equipment and single plant radiators with variable speed drive fan motors.

iv Plant Lighting - Inefficient light sources (incandescent, standard fluorescent) are being replaced, where appropriate, by high efficiency light sources (high pressure sodium or fluorescent with solid state ballasts). However, following detailed investigation the fitting of motion sensors and/or timers was rejected due to the complexity and possible operating problems. Readily accessible light switches are being provided and operators in semi-attended plants are being encouraged to conserve energy by turning lights off when they are not needed.

v Power Usage Inventory - A complete inventory of diesel plant loads has been assembled. This inventory is now being analyzed to assess which loads can be reduced, which eliminated and which can be provided more efficiently.

(c) Hydro Facilities

Hydro has a number of serviced facilities throughout the isolated diesel systems (i.e. trailers, line depots etc.) which can add to the cost of servicing these systems. An initiative is

now under way to properly record the consumption at these facilities and these records will be reviewed to determine the potential for reducing this load.

(d) Distribution Losses

Hydro is evaluating the cost of transformer losses in rural systems. The review will help identify situations in which technologies such as amorphous core transformers may be used.

2.3 COST REDUCTION

2.3.1 Reducing Capital Costs

(a) Plant Design

The standard design of diesel plants formulated by the Diesel Standards Committee incorporated the original goals, to provide a conventional plant, having adequate working space at the least possible cost. The Task Force identified the potential to further reduce the size, complexity and cost of plants for special cases.

These special cases include very small plants or small plants serving communities with zero or negative load growth. Several years ago the concept of modular plants was investigated. In such plants each engine was to be contained in an individual module resembling a trailer or shipping container and an additional module would be provided to house the control room and plant services. This concept was studied in detail and it was concluded that such a plant could not be constructed at a lower cost than a conventional plant and would have disadvantages for the operators.

As a result of the Task Force investigations the concept of a "less than standard" plant has been developed for use at very small locations such as Mud Lake. A proposal was submitted and approved by management for the construction of a trial packaged plant at Mud Lake. A packaged generating set consists of a generating set installed inside a weather-proof

enclosure which is not much larger than the generating set. Unlike a modular unit, there is no room for a person to walk around the generating set inside the enclosure. Maintenance is performed on a packaged generating set from the outside, through hinged access covers.

The experiment will consist of a single packaged generating set located on a platform adjacent to the existing Mud Lake diesel plant. The experiment will be conducted over two winters and will determine if the concept is practical.

(b) Plant Construction

The suggestion was made that plant construction costs could be reduced by Hydro contracting the work itself. This concept was investigated by Hydro's Construction Department and it was concluded that for most cases the classical method of engaging a contractor through the public tender process was the most cost effective method. The study did indicate that there were some exceptions to this general rule:

i Where detailed cost estimates indicate that for some site specific reason self contracting would be more cost efficient,

ii where work is not time sensitive and could be performed on an as available basis, this is the justification used for employing Hydro's Happy Valley personnel for the construction of the experimental packaged generating unit at Mud Lake,

iii where the value of the work is too small to warrant public tendering,

iv where the work may be subject to frequent interruptions due to operating exigencies,

v where isolation permits of continuous or sufficient duration cannot be guaranteed, and

vi where the work has been tendered and the price is demonstrably excessive.

(c) Planning Criteria

In the last year, the System Planning Department has initiated a review of its generation planning criteria for isolated diesel plants. This includes a review and report on the current practices of other Canadian utilities on this topic. A questionnaire was developed and sent out

in August, 1994 and to date six of the eight utilities contacted have provided responses. A preliminary analysis indicates that Hydro's firm generation criteria is less stringent than most other utilities' criteria. That is, most other utilities add generation sooner, and have more generation capacity in reserve than they would have if Hydro's criteria were used. System Planning is now in the process of preparing a summary report on the questionnaire results.

With regard to the issue of installing an additional level of redundancy in remote plants to offset emergency maintenance costs, System Planning has prepared a draft list of information required to complete a cost benefit analysis on this topic.

(d) Derating of Diesel Engine Capacity

In the Labrador isolated diesel systems, Hydro uses two grades of fuel, a winter grade and a summer grade. The winter grade fuel is lighter and typically contains five percent (5%) less thermal energy per unit volume than the heavier summer grade fuel. This low thermal energy has resulted in a derating of diesel generation capacities by about ten percent (10%) to account for the reduced output of an engine when compared to the output using summer grade fuel, for the same consumption rates in litres per hour.

An investigation into the derating of diesel units has revealed that it may be possible to mitigate the effect on diesel engine capacities of the lower energy content of winter grade fuels. Hydro purchases diesel generating sets on the basis of their base load rating. By international standard, a generating set must be capable of achieving an overload output to at least 110% of its base load rating. Thus by utilizing the overload capacity (increasing the fuel flow rate to the engine) it should be possible to accommodate the ten percent (10%) winter rating reduction. These findings were presented in a report which is being considered by TRO and System Planning. If accepted, Hydro could regain lost capacity on the diesel units and thereby defer the timing for future generating capacity.

(e) Depreciation.

Depreciation expense for the isolated diesel systems continues to increase from year to year due to the fact that assets, which were originally taken over at zero book value, are now, as replacement takes place, listed at the full construction cost value and depreciated accordingly.

A mitigating effect on the rural deficit will be the interconnection of the St. Anthony - Roddickton area, scheduled for completion in 1996. This will move approximately $2,000,000 depreciation expense from the isolated diesel systems to the interconnected system.

2.3.2 Automation

Automation is a means of improving plant efficiencies. A survey has been completed covering all diesel plants to determine the opportunities for automation. Automation is costly and technically difficult on older engines and therefore not economically justified. In situations where engines are being replaced, automation, while technically feasible, may be a justifiable expense only if there is some reduction in salary costs. Estimates are being prepared to cover all plants and situations.

2.3.3 Fuel Costs - The Tendering Process

Fuel costs account for about twenty percent of the total costs of delivering electricity service to rural customers. At present fuel suppliers pick and choose the specific diesel systems they wish to bid on throughout the Province depending on their assessment of competitive advantage coupled with the presence or absence of utility owned fuel storage facilities. A review of current diesel prices shows that Hydro pays a premium of about $.05 per litre for diesel fuel in systems with captive supplier storage versus utility owned storage. A similar premium exists for small diesel systems with regular diesel fuel delivery.

Ongoing analysis indicates that the cost of providing independent storage, and thus reducing fuel costs at certain remote sites, is not economic. An ongoing review of the

economics of fuel storage continues to be appropriate. Notwithstanding, a revised tendering process in which plants are grouped in areas and prospective suppliers may be guaranteed minimum product demand may lead to improved fuel prices overall.

2.3.4 Employee Education

The Task Force report discussed a number of options with respect to employee education. Broadening an operator's diagnostic capabilities as well as the overall skill level can have an impact on plant performance and overall maintenance costs. Operators based in the isolated communities are also in a position to influence the consumer's electricity use. Before any of this can be achieved it is recognised that a "Needs Identification Inventory" must be carried out since education needs are employee specific.

In line with Hydro's customer oriented DSM and energy efficiency initiatives, an employee awareness seminar was provided in the Fall of 1994 on these topics. The stated objective of the seminar was to provide employees with information so they are better able to understand Hydro DSM activities and to address customer questions and queries on these issues.

Also Hydro has embarked on a corporate program entitled LIFT (Learning Initiatives For Tomorrow). At this time a pilot program is underway involving TRO employees from the Newfoundland Central Area as well as employees from Churchill Falls. This program will be evaluated in July, 1995, and a determination made on the feasibility of implementing programs in other areas or, perhaps, with specific employee groups.

2.3.5 Heat Recovery

The three diesel plants constructed in recent years have all been equipped with heat recovery systems for heating the powerhouse. In Mary's Harbour a new church is being constructed near the powerhouse. Management has approved funds to install the necessary piping to this building so that it may be heated with waste heat energy. The church has agreed to install

the specialized heat exchange equipment in their building to utilize the heat. This project was undertaken as a demonstration project and heat will be provided free for a two year period. During this time Hydro will gather data to enable a better assessment of the commercial possibilities of the sale of heat. Recently there have been expressions of interest in similar waste heat schemes from a greenhouse operator in Port Hope Simpson and the RCMP in Mary's Harbour.

2.3.6 Maintenance Practices

Since the original report was completed an additional potential area for cost reduction has been identified.

The estimated cost of performing a major overhaul on a typical diesel engine is a significant percentage of the capital cost of a new engine. Major overhauls are performed at intervals based on running hours. If it is possible to extend the running hour interval between overhauls and to maintain the engine in good operating order by performing minimal maintenance, it may be more cost effective to replace the engine than to overhaul it.

Other benefits may result from such a change in maintenance practices, however, a study will be performed during 1995 to examine this option. With the present method of periodic overhauls, engines which have had several overhauls are in operation with many parts or components that are between ten and twenty years old. The sudden failure of such old parts may be the cause of a significant number of emergency service call-outs. It seems reasonable to assume that the number of such call-outs would be less for plants where all the engines are less than five years old, which would be the case if engines were replaced rather than overhauled. The more frequent replacement of engines would also ensure that the engines in service are all of the latest design, which should be more reliable and exhibit better fuel efficiency.

2.4 INCREASED REVENUE

The Task Force report of December 1993 contained a number of recommendations which related to reducing the rural isolated deficit by increasing revenues. There were seven specific rate initiative recommendations in the original report, viz:

* Government departments/agencies to pay full cost of service.
* Comparison of diesel system rates with other utilities having isolated systems.
* Reducing the level of lifeline rates.
* Elimination of the domestic second energy block tariff.
* Elimination of preferential rates.
* Introduction of a general service demand charge
* Formulate a new policy on capital cost recovery.

These recommendations all remain appropriate. However, there have been two changes in the environment since the preparation of the original report in 1993 that will reduce the estimated savings and incremental revenues.

1. The Northern Cod Moratorium and other adjustments in the fishing industry have resulted in reduced loads for some customers receiving preferential rates.

2. A decision has been made to interconnect the largest isolated system (St. Anthony, comprising approximately one-half of all isolated customers) to the Island grid in late 1996.

No action has been taken on any of these recommendations pending the outcome of the Isolated Rural Inquiry being held by the Public Utilities Board in the Spring of 1995.

The estimated incremental revenues resulting from each recommendation are based on the 1992 data used in the original report. No attempt has been made to update these amounts to reflect 1995 data or the impact of the interconnection of the St. Anthony system in late 1996.

Cost of Service studies prepared in 1995 project that the St. Anthony interconnection will reduce the isolated deficit by approximately 35%. It is reasonable to assume that the estimated incremental revenues related to each recommendation would be also reduced by a similar magnitude.

2.4.1 Cost of Service

The interconnection of St. Anthony isolated system to the island interconnected system in late 1996 will substantially change Hydro's cost of service for both the isolated and rural island interconnected customers. The following table illustrates the isolated deficit levels with and without the St. Anthony interconnection. The data used is meant to be illustrative and has been taken from NLH-1 and NLH-2 filed with the PUB in 1995. Note that the deficit will be reduced by $9 million. However, this decrease will be partially offset by an increase in the rural island interconnected deficit.

COST OF SERVICE DATA - ISOLATED DIESEL SYSTEMS	Including St. Anthony	Excluding St. Anthony
Revenues:	$10.8 million	$5.7 million
Expenses:		
Operating and Maintenance	$18.9 million	$13.9 million
Fuel	$7.2 million	$4.2 million
Depreciation	$3.9 million	$1.8 million
Interest	$6.6 million	$2.6 million
Expense Credits	-$0.2 million	-$0.2 million
Total Expenses:	$36.5 million	$22.4 million
Deficit:	-$25.7 million	-$16.7 million

Table 1
Cost of Service Data - Isolated Diesel Systems

2.5 OTHER INITIATIVES

2.5.1 Interconnection

The decision to interconnect the St. Anthony - Roddickton system will have a major impact on the cost, revenue and overall deficit associated with the isolated systems. Another system which has received tentative approval for interconnection is L'Anse Au Loup. Pending a final agreement between Hydro and Hydro-Quebec, the L'Anse au Loup system will be interconnected to the Blanc Sablon system in Quebec. This interconnection will allow Hydro to access secondary power and energy made available on the Hydro-Quebec system as a result of the Lac Robertson hydroelectric development. Based on current information, the L'Anse au Loup plant will be run only minimally for the first five years after interconnection. Following that period, the amount of secondary energy is expected to drop off due to load growth on the Hydro-Quebec system.

2.5.2 Federal Government Grants

An option that may be available for cost recovery on diesel systems could be recovery of Hydro's cost of service in aboriginal communities via Federal funding agreements. The provision of electricity in aboriginal communities is considered no different from other infrastructure, service, and funding requirements as per the scope of services provided for under the Indian Act, or any new directives or statutes which serve to set in motion the Federal constitutional obligation to aboriginal peoples. The financial losses incurred by Hydro ought to be responsibilities of the Federal Government of Canada, and thus federal taxpayers and not electricity ratepayers in the province, as is presently the case.

Communication has been established with the Intergovernmental Affairs Secretariat (Native Policy) of the Executive Council regarding the recovery of electricity cost of service under funding arrangements for the provision of services to aboriginal communities. Existing federal/provincial agreements expire in March 1996. These present arrangements do not include

provision for federal subsidy of costs associated with electricity service to aboriginal peoples. There is presently a period of flux regarding the relationships between governments and aboriginal peoples of Labrador. The Province has been requested to ensure that the electricity cost of service issue is properly represented and included in all dealings respecting institutional arrangements for aboriginal peoples funding.

2.5.3 Cost Sharing and Management of Pole Facilities

Hydro is presently negotiating a new agreement with Newfoundland Telephone for cost sharing and management of all jointly used pole facilities throughout Newfoundland and Labrador. Hydro has entered these negotiations with the mandate to negotiate an agreement that will provide for a more equitable sharing of all expenses associated with the joint use of poles especially on the isolated diesel systems.

2.5.4 Customer Service System

Hydro is presently investigating the acquisition of a new computerized Customer Service System. It is not possible at this time to determine what impact this new system may have on the cost of providing service to the isolated diesel customers.

2.5.5 Alternative Technology

The Task Force, while recognising that, at present, there appears to be no practical alternative to diesel generation in isolated communities, nevertheless highlighted two alternatives which may prove attractive in the future:

(a) Fuel Cells

In 1994 Hydro's System Planning Department completed a study of fuel cells and their potential applications in isolated rural systems. While fuel cells remain a promising technology, the current cost per installed kilowatt remains quite high. Fuel cells cannot currently compete

with conventional diesel generation on a cost effectiveness basis. Hydro's intention is to maintain current information on this technology, monitor the operating experience of other utilities and continue to assess cost effectiveness for additions or replacements in isolated systems particularly as Fuel Cell power plants using diesel fuel become commercially available.

(b) Wind Turbines

Hydro is continuing to monitor the cost-effectiveness of wind turbine generation. Hydro is also in the process of preparing guidelines for interconnection of wind turbines to isolated systems.

A manufacturer of integrated wind/diesel/battery energy systems was contacted to evaluate this technology for possible use by Hydro. This company (SMA Powercorp) has marketed and installed these systems around the world. The system will consist of a large battery bank electrically coupled to a wind turbine and diesel generator. The wind turbine delivers as much power as possible to the local grid, storing any excess power in the battery bank. The diesel is used to provide shortfalls in energy and peaking capacity. SMA's analysis considered use of this technology at Mud Lake and Black Tickle and found that such systems would not be economic for our application. The reason was fuel cost; areas where these systems have been successfully installed have diesel fuel costs of 75 cents/litre and higher, which is approximately double to triple the prices paid by Hydro, depending on location.

3 CONCLUSIONS

Measures which were identified by the Task Force following the review of the complete scope of Hydro's operations on the isolated diesel systems continue to be actively pursued by Hydro in order to find ways to reduce financial losses. Overall priorities continue to be to reduce operating costs and improve efficiencies.

In the light of current knowledge of and planned changes to the isolated electrical system, priorities for each initiative must be adjusted and potential savings modified. As in the first paper the priorities are as follows:

* Priority 1 indicates that the initiative is suitable for immediate implementation or has already been implemented.
* Priority 2 indicates that the initiative requires approval and/or could be implemented in the medium to longer term.
* Priority 3 suggests that more detailed study is called for before the initiative can be implemented in full.

3.1 CONSERVATION MEASURES

3.1.1 Demand Side Management

Hydro is developing its understanding of the opportunities and constraints of DSM undertaken with its customers on isolated diesel systems. A successful pilot project has been carried out on the Charlottetown diesel systems which demonstrates the ability of conventional DSM to reduce customer requirements without impairing service and to reduce and moderate community load growth. A second pilot has recently been undertaken in the community of Francois.

Revenue loss will be the constraint where utility avoided costs are limited to diesel fuel, notwithstanding that DSM is least cost against production. This will restrict the delivery of DSM on a system wide basis through the medium term. Hydro's pilot program with fuel substitution also shows that such initiatives are not economic if the only benefit accruing to the utility is avoided fuel. Generally, diesel DSM needs to attract avoided capital and operating credits to be economic in the context of deficit reduction.

In 1995 Hydro will be undertaking a load management pilot project aimed at diversifying a diesel household's electric hot water load against other durable appliance load in the home. The results of this work will be important in determining the extent to which the utility can favourably alter existing load shapes.

Priority 2

Potential Savings Function of system requirements.

ACTION LIST	RESPONSIBILITY	COMPLETION DATE
Continue with load management and report on cost effectiveness and actual savings.	Economic Analysis and TRO	Pilot Project and Report in 1995
Prepare evaluation report for Francois and re-visit all DSM undertakings for continuing assessment.	Economic Analysis and TRO	Late 1995
Continue to integrate demand side issues into diesel planning to ensure a minimization of customer revenue requirement.	System Planning, TRO and Economic Analysis	1995 Onwards
Investigate the potential for negotiated interruptible power contracts with major general service customers	TRO and System Planning	1995

3.1.2 Loss Reduction

Recognizing the disparity between sales and production for some isolated diesel systems an in-depth study has been initiated to quantify station service consumption and system losses in all isolated diesel systems. The study will include:

* Completion of the testing and documentation of all diesel plant metering to the same standards as service metering.

* Identification and recording of all electricity usage in Hydro's facilities other than diesel plants e.g. trailers, line depots etc.

Major consumers are to be encouraged to install low loss, efficient equipment. A minimum standard, or industry guide, for equipment efficiency is to be published. In particular, major customers are to be informed of the economic benefits of the 90% power factor rule and steps will be taken to enforce compliance.

Hydro will continue with the program of replacing mercury vapour street lights with high pressure sodium installations. Where the costs of system losses provide justification, amorphous core transformers will be used for distribution services.

Priority	1
Potential Savings	3% - 5% Production Costs. ($240,000 to $400,000)

ACTION LIST	RESPONSIBILITY	COMPLETION DATE
Test and recalibrate all plant metering to acceptable standard and quantify station service and system losses	TRO	Mid 1995
Prepare industry guide for equipment efficiency	TRO and Engineering	Mid 1995
Carry out cost benefit analysis of amorphous core transformers and report	System Planning, TRO and Engineering	Mid 1995
Promote and enforce 90% P.F. rule	TRO	Continuous

3.1.3 Reduce Station Service

A review of station service consumption has been initiated and will identify potential areas for savings. Low loss equipment, variable speed motors, improved lighting should be used where possible. As well, electric space heating should be replaced with diesel engine heat recovery systems where economically justified.

Priority	2
Potential Savings	1% - 5% Production Costs. ($80,000 to $400,000)

ACTION LIST	RESPONSIBILITY	COMPLETION DATE
Complete power usage inventory of all plants to determine all station service Loads	TRO	1995
Eliminate electric space heating in diesel plants where economically justified.	System Planning, TRO and Engineering	Continuing
List and prioritize all station service power reduction options and report	TRO	1995

3.2 COST REDUCTION MEASURES

3.2.1 Reduced Capital Costs

A design has been developed by Hydro engineering of a new format of diesel plant layout which will reduce capital costs of new or replacement installations by over 35%. Estimates proposed for Mud Lake indicate that the costs for a conventional and packaged plant arrangement are approximately $900,000 and $1,500,000, respectively. To test the viability of this concept, an experimental packaged generating set is to be installed in Mud Lake in 1995 and tested through at least two winters.

Priority	1
Potential Savings	35% - 50% Capital Costs
	$450,000 to $700,000 per plant.

A detailed study has indicated that for the majority of construction projects public tendering is the preferred method of construction. The study did identify circumstances under which it would be less costly to perform the construction using Hydro resources. The method of construction should be considered for each project to ensure that the most economical method is used.

ACTION LIST	RESPONSIBILITY	COMPLETION DATE
Include package plant design option in all future plant replacement analyses.	TRO, System Planning and Engineering	Continuing
Include self contracted labour option in all future plant extension and replacement analyses.	Engineering and TRO	Continuing

3.2.2 Planning Criteria

The generation planning criteria is currently under review. While changing the criteria would have an effect on generation expansion costs, it is unclear at this point if a change is necessary and if so, in which direction the costs would move.

A study indicated that it may be possible to eliminate the derating of diesel engines using arctic grade fuel. TRO is considering the recommendations of that report.

Priority 3

Potential Savings Not determined

ACTION LIST	RESPONSIBILITY	COMPLETION DATE
Continue investigations into the rating of diesel engines under winter operating conditions	System Planning, TRO and Engineering	Mid 1995
Complete review of the planning criteria used for diesel system and plant design and extension, including a review of methods in other Canadian utilities and report.	System Planning	Mid 1995
Prepare a new standard for System Planning criteria, if required.	System Planning	Late 1995

3.2.3 Reduced Maintenance Costs

The frequency of maintenance and overhauls performed on diesel engines is being examined to determine if it is possible to extend the period between overhauls, or eliminate some altogether, to reduce operating costs.

Priority 3
Potential Savings Not Determined

The full benefits of the maintenance planning facility are yet to be realized; the computer program "MAXIMO" requires upgrading to an interactive planning and data storage and retrieval facility.

Priority 1
Potential Savings Not Determined

ACTION LIST	RESPONSIBILITY	COMPLETION DATE
Carry out a cost benefit analysis of the surplus equipment option in plants with high maintenance travel costs and report.	TRO, System Planning	1995
Carry out a detailed study of staff training and the dual skills option and report.	TRO and Personnel	1995

3.2.4 Reduced Fuel Costs

Unless Hydro can assure all suppliers of open access to all diesel systems, Hydro is not strategically positioned to pursue high volume regional, or Provincial procurement for the diesel system. The tendering procedure itself is required under existing legislation and this prevents negotiation by the utility amongst the potential competitors.

Alternatively, Hydro could insist on regional bidding for a trial tender and leave it to the suppliers to subcontract and swap as they see fit, as such practice is common in the oil industry. On a more limited scale, where existing systems can be regionally grouped and all have utility storage, as in the case of Labrador coastal regions, Hydro should arrange for a trial tender during the next tendering stage and evaluate the supplier response.

Priority 2

Potential Savings A 1 ¢ per litre average price change is equivalent to $225,000 per year.

ACTION LIST	RESPONSIBILITY	COMPLETION DATE
Include a regional bid request in addition to existing individual systems in future fuel specifications.	TRO	1996
Continue to monitor opportunities for replacing suppliers' fuel storage and handling equipment	TRO, System Planning	Continuing

3.2.5 Automation

Automation will continue to be specified where appropriate in future plant replacements and major refits. Cost savings are dependant on the opportunities to reduce salary costs through attrition or reduction in overtime expenses.

Priority 3

Potential Savings Up to $50,000 per plant per annum

ACTION LIST	RESPONSIBILITY	COMPLETION DATE
Carry out a survey of other utilities and complete cost benefit analysis of opportunities for automation of plant operation and loading.	TRO, System Planning and Engineering	1995
Specify electronic recording instrumentation with remote access in all future plant replacements and extensions.	Engineering and TRO	Continuing

3.2.6 Employee Education

Hydro will continue to develop staff training and educational programs to ensure that employees are equipped for their role both in plant operations and maintenance as well as Hydro's first line contact with its customers

Priority 1

Potential Savings 1% to 2% of operating and maintenance costs. ($150,000 to $300,000)

ACTION LIST	RESPONSIBILITY	COMPLETION DATE
Continue to monitor and recognize operator performance and determine where improvements are necessary.	TRO and Human Resources	Continuing
Provide energy efficiency training to employees	TRO and Human Resources	1996
Implement employee education program including the LIFT Program, following program evaluation	TRO and Human Resources	July 1995

3.2.7 Heat Recovery

A demonstration project funded by Hydro has begun at Mary's Harbour, where waste heat will be utilized to heat a new church.

Priority 3

Potential Savings 100% of present space heating fuel costs, including Hydro facilities Additional revenue from the sale of heat to domestic and commercial customers.

ACTION LIST	RESPONSIBILITY	COMPLETION DATE
Complete inventory of potential opportunities for district heating, prioritize and report, following pilot project at Mary's Harbour.	Engineering, TRO, System Planning	1996
Contact Department of Public Works to review opportunities for heat recovery systems.	Engineering and Planning	1995

3.3 REVENUE ADJUSTMENTS

The revenue adjustment recommendations, which are outlined in the following paragraphs, are pending the outcome of the 1995 Hydro Rural Rate Inquiry and any recommendations from the Public inquiry that may be made by the Public Utilities Board to Government.

3.3.1 Government Department/Agencies

Several utilities charge government departments and agencies the full cost of service. If Hydro were to adopt this policy rural isolated revenues would increase significantly. The original

report quantified additional revenues at $2.6 million. With the interconnection of St. Anthony it is anticipated that this number will be reduced substantially.

Priority	2
Potential Savings	$2.6 million per annum

3.3.2 Comparison with Other Utilities

This recommendation suggested that Hydro should review the rate policies employed by other utilities in isolated areas to see if any would be applicable to our situation.

3.3.3 Lifeline Rates

While the lifeline rate comprises a significant portion of the isolated deficit the original report recommended that it be maintained. However, it was felt that the size of the life line block should be reviewed.

Priority	2
Potential Savings	$200,000 per annum

3.3.4 Domestic Second Energy Block

It was recommended that Hydro should discontinue the 700 kWh - 1000 Kwh block for domestic customers and instead have the higher energy rate apply to all energy consumption over 700 kWh/month.

Priority	2
Potential Savings	$350,000 + per annum

3.3.5 Preferential Rates

It was recommended that Hydro eliminate preferential rates provided to fish plants, churches, schools, etc. over a 5-10 year period. The potential savings here will be substantially reduced by the closure of fish plants over the past several years and the St. Anthony interconnection in 1996.

Priority	2
Potential Savings	$1.3 million per annum

3.3.6 General Service Demand Charge

The original report recommended that Hydro should introduce a demand charge for the general service customers. At present, the general service rate is an "energy-only" rate with a base customer charge.

Priority	2
Potential Savings	$350,000 + per annum

3.3.7 Capital Cost Recovery

The new policy being formulated to recover the capital cost of installing required generation equipment due to the addition of a major general service customer will incorporate the same underlining philosophy of fair and equitable cost of service to all customers in a similar manner as the rural distribution capital cost recovery policy.

Priority	3
Potential Savings	Up to 100% Capital Costs

3.4 OTHER INITIATIVES

3.4.1 Interconnection

Hydro's goal to reduce its cost of service in isolated systems can, in certain circumstances, be achieved through interconnection. Whenever such an interconnection can be shown to be cost effective and meet Hydro's criteria, the interconnection will be developed. Interconnection studies are being carried out on an ongoing basis. As changes in costs of service for isolated systems occur, these studies are updated.

Priority	3
Potential Savings	Diesel production costs

3.4.2 New Technology

After a review of fuel cell technology, the potential for its integration into Hydro's rural isolated systems is minimal for the foreseeable future. Hydro will continue to monitor the developments and costs related to the technology. Hydro will also continue to monitor developments related to wind turbine technology in order to identify instances in which the technology can be implemented on a cost effective basis.

Priority	3
Potential Savings	Not determined

3.4.3 Government Grants

The Executive Council has agreed to include Hydro's cost of service issue in consideration of its negotiations of aboriginal funding arrangements to succeed those now in place and to include Hydro in such related discussions. Correspondence will be sent to the Executive Council in 1995 re-confirming Hydro's serious interest in this matter.

On a more specific level, should the proposed relocation of Davis Inlet go ahead, Hydro will insist on infrastructure capital through federal funding to fully defray any incremental capital expenditures forced on Hydro's customers should Hydro continue to be the operating utility for the relocated community.

Priority	3
Potential Savings	New capital and operating costs for services in aboriginal communities

3.5 CONCLUSIONS

The table on the following page summarizes the foregoing review and conclusions. The maximum potential benefit from all the above initiatives may result in a total deficit reduction in the order of several million dollars per annum in the long term. However, recognizing that many changes and recommendations would be subject, first of all to approval by the Hydro Board and eventually to approval by the PUB and, ultimately, the Provincial Government, a realistic target deficit reduction cannot be estimated at this time. A more detailed investigation into many of the initiatives is called for together with further consultation with Government and other agencies.

INDEX	TOPIC	PRIORITY	SAVINGS POTENTIAL
3.1	**Conservation Measures**		
3.1.1	Demand Side Management	2	Function of system requirements
3.1.2	Loss Reduction	1	3% - 5% Production Costs
3.1.3	Station Service	2	1% - 5% Production Costs
3.2	**Cost Reduction Measures**		
3.2.1	Capital Costs	1	35% - 50% Capital Costs
3.2.2	Planning Criteria	3	Not determined
3.2.3	Maintenance Costs / MAXIMO	3/1	Not determined
3.2.4	Fuel Costs	2	1 ¢ per litre = $225,000 per Annum.
3.2.5	Automation	3	Up to $50,000 per plant per Annum.
3.2.6	Employee Education	1	1% - 2% Operating Costs
3.2.7	Heat Recovery	3	100% present site space heating fuel costs. Additional revenue from sale of heat to domestic and commercial customers.
3.3	**Revenue Adjustments**		
3.3.1	Government and Agency Rate Classifications	2	$2.6 million per Annum
3.3.3	Lifeline rates	2	$200,000 per Annum.
3.3.3	Preferential Rates	2	Up to $200,000 per Annum.
3.3.4	Domestic second energy block	2	$350,000 per Annum
3.3.5	Preferential rates	2	$1.3 million per Annum
3.3.6	General service demand charge	2	$350,000 per Annum
3.3.7	Capital Cost Recovery	3	Up to 100% Capital Costs
3.4	**Other Initiatives**		
3.4.1	Interconnection	3	Diesel production costs
3.4.2	New Technology	3	Not determined
3.4.3	Government Grants	3	New capital and operating costs for services in aboriginal communities

Table 2
Deficit Reduction Initiative Summary