Appendix "A"

BACKUP POWER RATES

FOR

MUNICIPAL ELECTRIC UTILITIES

The Municipal Electric Association
Backup Power Rate Sub-Committee

EXECUTIVE SUMMARY

This report was prepared in response to requests from municipal electric utilities for guidance in preparing rates to be charged to non utility generators (N.U.G.'s) for the supply of backup power.

Three broad cost categories have been identified that should be recovered from N.U.G.'s requiring backup supply from municipal utilities and Ontario Hydro.

The first costs are those associated with protection, metering controls and other plant or services which must be provided when a N.U.G. is connected to the distribution system for the supply of backup power. Such costs should be recovered upfront in the form of a capital contribution.

The second costs are those associated with reserving part of the distribution system to be in a position to provide backup power when required by the N.U.G.. These costs should be recovered through a monthly facilities charge applied on a per kW basis to the amount of potential backup load specified and mutually agreed to in a contract. This charge is recovered whether backup power is taken or not. Similarly, Ontario Hydro will look to recover their own costs of reserving parts of their generation, transmission and other assets to provide this backup service in their own facilities charges.

The third costs relate to the cost of backup power supplied. This report recommends that these costs be recovered by applying a wholesale backup rate. The wholesale backup rate would not include local incremental costs, these costs would be added to the wholesale cost to arrive at the retail cost. This approach provides the N.U.G. with the benefits of diversity among N.U.G.'s on a province wide basis and removes the added cost of any coincidence with the utility's peak from the utility's wholesale cost for firm power. It also provides an incentive in the form of a daily demand charge for N.U.G. to return their generator to service promptly.

This report recommends that the amount of backup power supplied be determined by metering the generator. Any shortfall between the normal maximum output of the generator as specified in a contract and actual generator output will be deemed to be backup supply. Some allowance for load shedding may be provided.

All of these costs and charges are described in more detail in the report. Alternatives have also been discussed in some detail.

Municipal utilities remain free to propose alternatives subject to Ontario Hydro approval. This report should be helpful in preparing backup rate proposals regardless of the method preferred by the local utility.

The report will eventually go to Ontario Hydro, who are expected to reply with draft policies, regulations and rates for discussion. At that point, the regulator's position will be known, and MEA will be able to produce a set of definite guidelines.

INDEX

1. INTRODUCTION

Non utility generators or N.U.G.'s are a relatively new and growing part of our industry in Ontario. Their relationship with municipal utilities and consequently Ontario Hydro is unlike any other. Their load is not served exclusively by the utility, and, in fact, may be served only on an intermittent basis. They can, at any given time, be a supplier, a competitor, and/or a customer.

In Ontario, at this time, surplus generation and the prohibition on wheeling may present some limitations on N.U.G.'s wishing to sell excess generation output to utilities or Ontario Hydro. This restriction essentially confines their role to providing part of their own load. This internal supply displaces utility supplied load which in turn reduces revenue and may reduce net income. As a customer, they may require part of their normal electrical supply to be provided by the utility and they almost always expect the utility to provide back up power when their generator is out of service for scheduled maintenance or as the result of equipment failure. It is in the supply of back up power that many of the difficulties in dealing with N.U.G.'s arise. Depending on the policies, procedures and rates adopted, much of the risk associated with supplying backup power to a N.U.G. may be transferred to the utility and its customers, or Ontario Hydro and the other members of the power pool.

The M.E.A.'s Retail Costing and Rates Committee has recognized that N.U.G.'s are becoming a significant factor in Ontario. Many utilities are seeking guidance in dealing with this new and complex phenomenon and as a result, a sub-committee was formed to examine this situation and provide direction.

The sub-committee had its first meeting on September 29, 1993 at which time it was decided that we would be guided by the following basic principles.

1. We will formulate guidelines which will provide direction and specific suggestions for municipal utilities to use in developing retail back up power rates. These guidelines will be used by Ontario Hydro to evaluate back up power rate proposals presented by municipal electric utilities for regulatory approval.

2. Backup rates should be designed to save harmless all other participants in the Ontario Hydro - Municipal Utility pool. Advantages should not accrue to N.U.G.'s, customers, and/or utilities charging backup rates at the expense of other customers and/or utilities and/or Ontario Hydro. Similarly, the N.U.G. should be saved harmless from punitive rates. Backup rates should recover all costs associated with relevant facilities or power supplied.

3. Facility charges and standby power rates should be developed using average embedded costs unless otherwise noted for specific situations. Average embedded costs are also known as accounting costs and are based on the investment in facilities recorded in the utility's financial statements. These statements record the amount spent to build or acquire facilities each year in the past. Thus, the recorded investment in plant on the books reflects investment history without regard for inflation and is, therefore, usually lower than present or replacement costs for the same facility. The reference to average embedded costs is made to differentiate our approach from one based on marginal costs, avoided costs, or replacement costs.

4. Since wheeling power within Ontario is not allowed at this time, we will deal primarily with load displacement N.U.G.'s. The recommendations at the end of this report could be applied to other N.U.G.'s such as Purchase N.U.G.'s etc. We won't deal with wheeling.

5. Individual situations may require special treatment from the utility. Large N.U.G. installations or particular equipment difficulties may prompt the utility to deal on a site specific basis. Utilities continue to have the option of seeking special treatment for unique situations provided that their proposals can be supported appropriately and thoroughly.

2. RECOVERY OF CONNECTION COSTS

When a contractual agreement is made between a utility and a N.U.G., it should be clearly specified that the N.U.G. will pay for all special equipment required **due to the presence of their generator on the distribution system.**

The N.U.G. would therefore be expected to pay for all equipment, switches, fuses etc. which may be needed to protect utility equipment and personnel because of the generator's presence on the distribution system. The N.U.G. may also be required to pay for any extra metering costs associated directly with the need to provide and meter standby power. Since the customer has undertaken to install and operate a cogeneration facility to satisfy their own business objectives, then the meter costs should be recovered in the capital contribution prior to connection.

Beyond the protection and metering costs identified above, capital contributions should also be applicable to any connection costs attributable to the N.U.G. which are not recovered through your utility's line extension policy, development charge bylaws or retail rates. The N.U.G.'s total load requirement, including the standby commitment should be included in the calculation of amount to be recovered through line extension and/or development charges. Capital contributions, line extension charges, development charges and facilities charges which will be discussed later, should be carefully integrated to avoid double counting of costs to be recovered.

3. READINESS TO SUPPLY

In addition to costs associated with the presence of the generator on the distribution system, there are also costs associated with **reserving part of the distribution system to be ready to provide backup power when required by the N.U.G.**. If the N.U.G. is particularly small (under 100 kW) **and** not a significant part of the utility's load, then the application of regular (firm) rates may be adequate to recover both the cost of reserving part of the distribution system and the cost of power supplied on a backup basis.

If it can be demonstrated that the application of regular (firm) retail rates does not adequately recover these costs, then it will be necessary to provide an estimate to justify a separate **facilities charge**. This facilities charge will be applied each month to the contracted amount of potential backup load whether taken or not. This potential backup would typically be the maximum generator output during full normal operation. This should be very close to the rated capacity of the generator.

Agreement by the Utility to accept backup quantities which are significantly lower than generation capacity, should be supported by a strong load shedding plan or assurances from the customer with supporting rationale that normal electrical requirements can be reduced. Performance should be monitored to ensure that firm power is not supplied at backup power rates.

The costs to be recovered include depreciation, financing, operation, maintenance, rate of return and possibly administration costs associated with this service. It is also recommended that the facilities charge recover any additional meter reading, billing and other similar costs which may be attributable to this special service.

The facilities charge may be calculated based on **pooled costs** or on **specific costs**. These two methods may be combined. Specific costing for determination of the facilities charge would be preferred in the case of dedicated plant and pooled costing would be preferred in the case of shared plant.

(a) **Pooled Costs**

With this method, typically, the average embedded costs of all relevant distribution equipment, owned by the utility that could be used to supply backup power, are added together and then expressed on a per kW or per KVA basis. The usual cost items to be included in the pooled numerator include distribution transformers, secondary lines, primary lines, feeders, and possibly municipal distribution stations. The numerator should not include any costs for classes of equipment that are customer owned and maintained (e.g. transformers if customer supplied) or are not used by the customers (e.g. secondary lines if served at distribution voltage).

The numerator should include depreciation, rate of return on the net book value of pooled assets as well as relevant operation, maintenance, and administration expenses. In calculating the numerator, it may be necessary to look at more than one year to reflect a normal or typical situation. If system capacity is changing rapidly or if there are extraordinary costs in one year, then the resulting charge may not fairly recover cost and may be unstable.

The denominator should provide an indication of the overall capacity of the distribution system. The recommended measure is the total system feeder capacity at the supply points for the utility. This denominator would be expressed in kW or KVA.

In an Ontario Hydro report entitled "**Standards for Supply to Municipal Utilities Supplied Directly from Ontario Hydro Owned Transformer Stations**", it is stated that a likely need to supply additional feeder breakers is recognized when average peak loading on the existing feeders supplying a municipal utility exceeds an average load per feeder as indicated below.

Voltage	44 kV	27.6 kV	13.8 kV
Average Feeder Load	25 MVA	16.7 MVA	7.5 MVA

These feeder loadings may be the most appropriate way of determining total system capacity for use as the denominator in the pooled costing calculation. Local service level standards such as **single outage contingency** and other factors determined by the local utility may influence the determination of the denominator.

A typical pooled cost calculation of a facilities charge is shown below.

	DECEMBER 31, 19XX	NOTE
DISTRIBUTION PLANT		
O.H. DISTRIBUTION PLANT	$37,400,000	(1)
U.G. DISTRIBUTION PLANT	59,200,000	(1)
SUB STATION FEEDER SYSTEM	10,000,000	
TRANSFORMERS		
TOTAL PLANT	$106,500,000	
SUBTRACT ACCUMULATED DEPRECIATION		
O.H. DISTRIBUTION PLANT	$15,200,000	(1)
U.G. DISTRIBUTION PLANT	18,900,000	(1)
SUB STATION FEEDER SYSTEM	5,600,000	
TRANSFORMERS		
TOTAL ACCUMULATED DEPRECIATION	$39,700,000	
NET RATE BASE (A)	$66,900,000	(2)
RATE OF RETURN (B)	4.84%	(3)
RATE TO BE RECOVERED (A) * (B)	$3,240,000	*
ADD ANNUAL MAINTENANCE EXPENSE		
O.H. DISTRIBUTION PLANT	$1,700,000	(1)
U.G. DISTRIBUTION PLANT	1,700,000	(1)
SUB STATION FEEDER SYSTEM	1,300,000	
TRANSFORMERS		
TOTAL MAINTENANCE EXPENSE TO BE RECOVERED	$4,700,000	*
ADD ANNUAL BASE YEAR DEPRECIATION COSTS		
O.H. DISTRIBUTION PLANT	$1,600,000	(1)
U.G. DISTRIBUTION PLANT	2,000,000	(1)
SUB STATION FEEDER SYSTEM	400,000	
TRANSFORMERS		
TOTAL DEPRECIATION EXPENSE TO BE RECOVERED	$4,000,000	*
ANNUAL TOTAL TO BE RECOVERED (C)	$11,940,000	
INSTALLED CAPACITY KW (D)	840,000	
COST PER KW PER YEAR (C)/(D)	$14.21	
COST PER KW PER MONTH (C)/(D)/12	$1.18	
ADDITIONAL BILLING COST PER KW PER MONTH	$0.02	(4)
PROPOSED FACILITIES CHARGE PER KW PER MONTH	**$1.20**	

* INCLUDED IN (C) BELOW

Notes for Pooled Cost Calculation

(1) Where possible, this data should exclude costs for equipment not used to provide potential backup service at a particular service level, i.e. the figure shown should exclude utilization voltage secondaries, service drops etc. If these numbers are not recorded explicitly, they should be estimated. There is no cost provided for distribution transformers because the level of service in the example is above utilization voltage.

(2) Note that the rate base now includes assets financed by capital contributions to be consistent with changes in the rate of return calculation procedure introduced in 1994.

(3) Rate of return is based on a rate base including assets financed by capital contributions. The number should reflect a typical, normal situation. The average of the utility's actual historic results over the past 3 to 5 years may be appropriate.

(4) A specifically costed item expressed in kW per month.

The pooled cost calculation presented above assumes that all distribution station and line costs are attributable to demand. This is somewhat contrary to cost of service principles which would call for part of this expense to be attributable to the number of customers served. It is suggested that in lieu of segregating demand and customer costs and basing this calculation strictly on demand costs plus a provision for administration, that the gross cost as shown be used without an administration cost adder.

The formula will give results that may vary widely between utilities. The **pooled** cost approach must be kept simple to preserve its merit, otherwise it begins to resemble the specific cost approach discussed below.

A list of accounts taken from Ontario Hydro's **Accounting for Municipal Electric Utilities** in Ontario which may be considered in determining a facilities change are shown in the attached Appendix A.

Some individual utilities may not use the accounts shown in Appendix A. The appropriateness of each account is dependent on how expenses are recorded at each utility.

(b) **Specific Costs**

A facilities charge based on an examination of the specific costs of the particular facilities used to supply a customer, may be the preferred method if the customer is large or a significant part of the utility's load. This requires that a detailed cost analysis be undertaken for each N.U.G. facility and would probably produce a different facilities charge for each N.U.G. served by the utility.

Generally, it is preferred that average embedded costs be used to estimate the value of specific facilities. In some cases, however, it may be justifiable to use replacement costs when evaluating specific plant costs. The use of replacement costs might be justifiable if development charges or line extension policies inadequately recover costs. In such cases, it would be preferred if the development charges or line extension policies were changed.

(c) **Ontario Hydro Facilities**

Presently, Ontario Hydro is contemplating the introduction of **wholesale backup power rates.** If approved, the application of these rates is likely to be mandatory unless a utility has an existing, approved backup power rate or can provide compelling reasons to be excluded.

Generally, if a N.U.G. represents 10% or more of a utility's load or otherwise causes Ontario Hydro to contemplate additional expenditures to serve backup load, then Ontario Hydro is likely to require that both the N.U.G. and the utility sign a tri-party agreement for the supply of backup power. This in turn will likely result in Ontario Hydro specifying that wholesale backup power rates be applied on the utility and consequently on the N.U.G. Illustrative 1995 wholesale backup power rates, are shown in Appendix B. Local facilities' charges can be applied by the utility in addition to the facilities charge applied by Ontario Hydro as part of the wholesale rate.

(d) **Application of Facilities Charges**

Facilities charges may be applied in addition to regular (firm) retail rates or, more likely, in conjunction with a backup power rate each month. As mentioned earlier, these charges are applied each month to a contracted amount of potential backup load whether backup is supplied or not.

When the facilities charge is applied in conjunction with regular retail rates, it is recommended that the facilities charge be reduced to adjust for the double recovery of facility costs when both the facilities charge and the application of regular retail rates occur in the same month. In other words, the facilities charge will be reduced to reflect the expected frequency of standby supply. The facilities charge may be subject to review once some experience with respect to the frequency of standby supply is gained. No such adjustment is necessary if specific backup power rates are developed.

4. COST OF SUPPLYING BACKUP POWER

In addition to costs recovered by capital contributions and monthly facility charges, the utility should recover the cost of power including losses associated with the energy supplied to a N.U.G. on a backup basis. In addition to the cost of losses, the recovered cost should include operating, maintenance, and administration costs if they are not incurred in the facilities charge.

Every N.U.G. will have down time during which it will need backup supply. That down time can be as the result of scheduled maintenance or as the result of breakdowns which are, of course, not scheduled. Scheduled down time can be dealt with, in part through consultations between the utility, Ontario Hydro, and the N.U.G., so as to avoid peak or other inconvenient times. In such circumstances where advance notice can be provided, it may be appropriate to provide a financial incentive to the N.U.G. in the form of appropriate **backup power rates** to reflect cost savings.

Breakdowns, in particular, introduce the element of risk into our dealings with N.U.G.'s. The risk involves the cost effect that supply of backup power might have on the utility's and/or Ontario Hydro's peak demand. The customer, the utility, and the provincial power pool share this risk to varying degrees depending on the approach taken.

(a) Coincident Peak Backup Power Rates

One approach which is used now and which is essentially risk free as far as the utility is concerned, calls for the N.U.G.'s backup supply to be billed on a coincident peak basis at the utility regular (firm) wholesale rates. In this case, the demand of the backup supply **at the time of the utility's monthly peak** is measured and billed at the wholesale demand rate, plus a mark up to reflect local costs such as losses, net income and other local incremental costs. Again, local costs should be examined carefully to avoid double counting vis à vis other charges. The charge for backup energy supplied would also be based on wholesale rates plus a markup. With this method, the N.U.G. assumes most risks with respect to the cost of backup power supply. There is no need nor opportunity to differentiate between scheduled and unscheduled backup power with this method.

This approach has a lot of appeal if you want to guarantee that other customers will be "**saved harmless**". On the other hand, such a rate may be viewed as too risky, too expensive and too unstable for the N.U.G.. This may discourage a potential customer who may instead locate in another utility or outside the province.

(b) Wholesale Backup Power Rates

One of our principles called for rates which saved harmless all non-N.U.G. participants while not applying punitive policies or rates to the N.U.G.'s. This implies that risk should be reduced for all parties and or distributed evenly among all participants. To be fair and to avoid being punitive to the N.U.G., rates which reflect the cost of providing backup power should be developed. This will send a clear economic signal to the N.U.G.'s enabling them to determine the effects of scheduling the time and duration of maintenance and the promptness to be employed when responding to breakdowns.

The Backup Power Rate Sub-Committee believes that the development of a wholesale backup rate, which tracks wholesale costs, is the best way to distribute risk among the participants.

Ontario Hydro has developed wholesale backup power rates which are being reviewed by the Ontario Energy Board during the summer of 1994. These rates would be available to Direct industrial customers and municipal electric utilities with their own generation. In addition, municipal utilities could contract with Ontario Hydro to provide backup to a N.U.G. served by the utility and effectively pass through this wholesale backup rate. This latter action would be at the utilities option but subject to Ontario Hydro approval.

The proposed Wholesale Backup Power Rates have the following features.

1. They are based on embedded cost of service methodologies.

2. They feature a **daily** demand charges which encourage the N.U.G. to return their generator to service promptly but does not penalize the N.U.G. with a high monthly demand charge if they require backup for only a brief period during the month.

3. There will be one daily demand charge for **scheduled** maintenance and another **higher** daily demand charge for **unscheduled** or **forced** outages.

4. A monthly facilities charge is levied on each kW of contracted backup power whether or not backup power is supplied. This is in addition to the utility's own facilities charge and reflects Ontario Hydro's costs of being ready to provide backup. This charge will include **power quality support charges**.

5. The municipal utility may apply its own facilities charge in addition to the facilities charge recovered by Ontario Hydro in the wholesale backup rate.

6. Power quality support charges will be included in the facilities charge or will be applied separately to N.U.G.'s connected to the system but not provided with backup power. These charges reflect the power, frequency, and voltage regulation benefits that accrue to N.U.G.'s by being connected to the Ontario Hydro/Municipal Utility system even if backup power per se is not supplied. Power quality support charges form part of the wholesale facilities charge. Power quality control charges will be mandatory if the N.U.G. is greater than 10 per cent of the municipal utility's load unless the N.U.G. is willing to provide adequate controls such as governors, voltage regulator etc.

7. There will be provision for the municipal utility to recover local incremental costs such as losses, local backup facility costs, etc.

8. Standard time of use firm wholesale energy rates will be levied on the number of backup kW.h's supplied.

9. These wholesale backup power rates will be subject to review and adjustment each year.

10. The wholesale backup rate will reflect the diversity between N.U.G.'s on a province-wide basis.

11. The same backup rate would be applied to most N.U.G.'s in the province. Municipal utilities would, however, retain the option of submitting their own backup power rate proposals to Ontario Hydro for approval. Municipal utilities who have already received approval for backup rates would likely be allowed to continue using them.

12. The effect of supplying backup power will be removed from the utility's regular or firm wholesale billing data.

Proposed Wholesale Backup Power Rate Structure Components

A rate structure defines the various charges that will be used by a utility to collect the revenue requirement based on customers' load characteristics. The proposed wholesale backup rate structure will include the following charges.

Facilities Charge

The **facilities charge** will be applied to the contract amount of backup load which is generally the maximum normal output of the generator. This charge will be applied whether backup power is taken or not and will recover the cost of Ontario Hydro's generation, transmission, regional supply and distribution reserved to supply backup power when required by the N.U.G.. It also includes power quality support charges.

This facilities charge would be in addition to the local facilities charged to recover the municipal utility's expenses.

Demand Charges

There are two outage charges. The **scheduled outage** charge is cheaper than forced outage rate and is available only if certain specified information is provided in advance to the utility and Ontario Hydro. If the requirement for the scheduled outage rate can't be met, then the more expensive **forced outage rate** is available. This rate has less stringent requirements but the N.U.G. is still required to provide some notice to the utility and Ontario Hydro.

The outage rates are seasonally differentiated **daily** demand charges. Normally, if a generator goes down, it will only be out of service for a short period of time, i.e., several hours or a couple of days. To apply a **monthly** rate to these short term demands could be quite onerous. On the other side, there should be an incentive for the customer to get his generator back in service promptly. Therefore, the proper balance appears to be a daily rate such that in the short term (several days) it would be less than a monthly rate, but if applied for the whole month would amount to more than the monthly rate for firm power.

Emergency Power

Ontario Hydro's wholesale backup rate proposal calls for standard firm power rates to be made available for N.U.G.s experiencing significant generation problems that neither Scheduled or Unscheduled backup power purchases accommodate. Thus, in case where a N.U.G. is expected to be out of service for a prolonged period and sufficient notice is provided to both the utility and Ontario Hydro, it is expected that firm retail rates will be applied until the generator is returned to service. In this way, the N.U.G. will avoid the relatively onerous burden of lengthy application of the daily demand change. In this instance, N.U.G.s must notify Ontario Hydro of their intent to purchase Emergency backup power, declare the estimated monthly requirements and identify the reason for the need.

Energy Rates

Current standard wholesale energy rates appropriately reflect energy costs of serving backup customers. Accordingly, backup energy rates will be the standard wholesale energy rates plus a losses adder.

Illustrative Rates

See the attached Appendix B for illustrative 1995 wholesale backup power rates.

Because this is a wholesale rate, the demand and energy data associated with backup supply will be segregated from similar data associated with regular or firm wholesale supply to the utility. The utility would therefore be billed for their monthly firm peak demand and energy excluding the effect of backup power supplied to the N.U.G..

With a wholesale backup power rate, a tri-party agreement will be set up whereby the utility will contract with Ontario Hydro to supply backup power to the N.U.G.. The utility would pay Ontario Hydro the wholesale backup charges and recover these costs as well as local charges such as the local facilities charges and the cost of losses from the N.U.G..

In determining losses to be recovered, it is suggested that average system losses for the whole utility should be used unless an engineering study to determine specific losses is available.

Since this is **not** a retail rate applicable at utilization voltage, it does not recover the cost of transformation and therefore no transformation allowance is applicable.

Ontario Hydro will provide criteria to determine if a N.U.G. is large enough to have potential significant impact on the Ontario Hydro - Municipal Utility power pool. At this time, it is expected that if the potential backup power supply to a N.U.G. represents 10% or more of a utility's load, or if Ontario Hydro might have to make a significant capital expenditure to ensure supply, then the N.U.G. will be a **pool issue** and application of the wholesale backup power rate will be mandatory. We expect that the question of a large N.U.G., being a pool issue, will be answered following the approval of the wholesale backup rate.

5. DIFFERENTIATING BACKUP AND REGULAR SUPPLY

When dealing with load displacement N.U.G.'s , it will be necessary to differentiate and clearly identify power supplied on a regular or firm basis from power supplied on a backup basis. We examined two ways of doing this. One method calls for metering generator output and applying backup power rates to the difference between the generator's normal maximum output and actual generator output. A second method calls for power supplied under **normal** or firm conditions to be specified and apply backup power rates to any measured demand that exceeds this fixed amount. Each of these approaches is described in more detail below.

(a) Meter the Generator

When a customer installs a load displacement N.U.G. to supply a portion of his load, the customer is effectively dividing his total electricity requirement into two components. The first being that which he intends to supply from his generator, and the second being that which he intends to purchase on a firm basis from the utility. This is illustrated on the attached Figure 1.

The customer's total electrical requirement is represented by the upper line (L). The rated capacity of the N.U.G. is a fixed amount (C). This is the amount that will usually be subject to the monthly facility charges. The actual generator output is measured by a meter and shown on Figure 1 as (G). This reading should be very close or equal to (C) when the N.U.G. is operating normally. The (F) component on the graph is the portion of the N.U.G.'s total electricity requirement supplied by the utility on a normal (firm) basis. This facility's total electricity requirement is shown as L on the graph and most of the time would be equal to G + F (generator output plus utility firm supply).

When the N.U.G. is out of service for whatever reason, the difference between (C), the N.U.G.'s rated capacity, and (G) the generator's output should become significant. In this case, the total supply from the utility (T) should increase to exceed (F), the usual firm supply. This increase should equal (B) the backup supply, the difference between C and G.

In order to determine these various billing quantities, it would be necessary to have meters on both the incoming supply line from the utility **and** the output of the generator. The relative positioning of these meters are shown vis a vis the supply sources and the load on Figure 1. The output from these two meters would have to be examined to determine the various billing quantities.

With this approach, standby rates would be applied to the **difference** (B) between (C) (the generator normal maximum which would be specified in the contractual agreement with the N.U.G.) and (G) (the actual output indicated on the meter). Therefore, anytime the generator is producing less than 100% of its normal maximum, the utility is deemed to be providing backup power and the N.U.G. will be charged accordingly.

This method provides the most direct definition of backup and is the method preferred by this sub-committee. It does however require more metering and it is difficult to give the N.U.G. any credit for load shedding.

When a N.U.G.'s facility is out of service, that N.U.G. may be able to reduce its total electrical requirement by shedding load. By postponing demand for electricity, when the generator is down, the N.U.G. may mitigate its affect on the utility's and/or Ontario Hydro's peak demand and in return avoid standby power charges. Strict application of the **Meter the Generator Method**, described above, does not provide for this.

It may be desirable to provide credit to the N.U.G. for shedding load when the generator is out of service. In such cases, the load that could be dropped should be clearly identified in advance so that agreement between the N.U.G., the utility, and Ontario Hydro can be reached regarding the practicality of providing a load shedding credit for this N.U.G.. The load to be shed should be load that is normally supplied when the N.U.G. is functioning normally. If sheddable load is a controversial issue, then it may be best to specify normal (firm) supply. This is discussed in more detail below. Once agreement is reached, it would be necessary to meter this sheddable load on a time of use basis so that it can be determined that this load was shed at critical times. The amount of backup supplied would then be reduced by the amount of load shed to determine standby charges.

It should be noted that billing expenses as well as the cost of meters used to credit and measure sheddable load are also to be recovered through capital contributions and local facilities charges.

The utility may reduce the facilities charges to reflect a contractual agreement which calls for the N.U.G. to shed load when the generator is out of service. If the N.U.G. fails to shed load appropriately, then the utility should retroactively apply the facilities charge for the last eleven months to the load not shed or back to the last month that load was shed appropriately, whichever is later. In addition, subsequent facilities charges will be subject to an eleven month demand ratchet with the original contract standby amount including the effect of the load shedding credit as a minimum.

(b) Specify Normal (Firm) Supply

In order to avoid installing more metering and to provide what amounts to automatic recognition of load shedding, some utilities may want to specify normal firm supply and deem load in excess of this contracted amount to be backup supply.

Contract Demand

Contract demand is the peak firm demand on the customers premises **not** supplied by the customer's generator. This demand is specified in a contract and supplied by the utility. All demand and energy charges related to contract demand will be billed at firm rates for the customers rate class. These can be time of use or non-time of use rates.

Standby Capacity

Standby demand is capacity reserved for the customer in excess of contract demand. This would typically equal the maximum output of the generator under normal operating conditions of the generator. Standby capacity would be stated explicitly in the contract between the N.U.G., the utility, and Ontario Hydro, billed at backup rates, and be subject to the monthly facilities charge.

Excess Power

Occasionally, demand might exceed the sum of contract demand billed at regular rates and standby capacity billed at backup rates. This excess is called supplementary power and billed at regular (firm) retail rates for the customer's rate class including, particularly, the **monthly** demand charge.

The utility should reserve the right to adjust the contract demand billed at regular rates if the power supplied by the utility regularly exceeds the sum of contract firm demand and contract standby capacity subject to the facilities charge.

Meters and Contracts

When a utility determines the amount of backup supplied through a meter on the generator, the utility should sign a contract with the N.U.G. for the supply of **firm** power. This will enable the utility's system planners to accommodate any growth in firm supply to be provided by the utility. The term of this contract should not exceed the utility's planning horizon.

Alternatively, if a utility determines the backup supply by specifying normal, firm supply, the utility should meter the generator to provide audit data. Metering should always be installed, if only to ensure that the customer will not get excess firm power at backup power rates.

6. BILL CALCULATION EXAMPLES

The various proposals in this report are illustrated in the example below.

Assumptions

Municipal Utility Billing Data (Including Backup Supplied)

500,000 kW (Occurs on day 1 of Backup Supply to N.U.G.)
150,000,000 peak kW.h
130,000,000 off peak kW.h
Summer Rates Applied for < 115 kV

Billing Data for N.U.G. Supplied by the Utility

Firm Supply	**Backup Supply**
	Contract Backup = 2,000 KW
8,000 kW	Day 1 - 1,000 kW
2,300,000 peak kW.h	Day 2 - 1,500 kW
2,200,000 off peak kW.h	28,000 peak kW.h
Summer Rates for Large User	22,000 off peak kW.h

Other Information

- utility losses = 4.0% (specific for this utility)
- local facilities charge = $1.20/kW/month
- backup supply on day 1 is 90% coincident with the utility's peak (900 kW of backup power were being supplied at the time of the utility's monthly peak)
- this was a **forced or unscheduled outage**
- the N.U.G. is supplied below 115 kV

Calculation of Municipal Utility's Power Invoice

System Peak	500,000 kW	Gross Day 1 of Backup Supply
less Backup supplied to N.U.G.	936 kW	(1,000 kW x 0.9 x 1.04)
Adjusted System Peak	499,064 kW	

Peak Energy	150,000,000 kW.h	
less Backup supplied to N.U.G.	29,120 kW.h	(28,000 x 1.04)
Adjusted Peak Energy	149,970,880 kW.h	
Off Peak Energy	130,000,000 kW.h	
less Backup supplied to N.U.G.	22,880 kW.h	(22,000 x 1.04)
	129,977,120 kW.h	

Application of Proposed 1995 Wholesale (Firm) Rates

499,064 kW @	$13.03	=	$6,502,804
149,970,880 kW.h @	$0.0374	=	5,608,911
129,977,120 kW.h @	$0.0234	=	3,041,465
Total Bill for Firm Power			$15,153,180

Application of Proposed 1995 Wholesale Backup Rates

2,600 kW @	$0.94	=	$2,444	(Forced Outage Rate x (1,000 + 1,500) x 1.04
29,120 kW.h @	$0.0374	=	1,089	
22,880 kW.h @	$0.0237	=	542	
2,080 kW @	$2.78	=	5,782	(Summer Facilities Charge x 2,000 kW x 1.04)
Total Bill for Backup Power			$9,857	
Total Power Invoice			$15,163,037	**To be paid by the Utility**

Calculation of Bill to be Paid by the N.U.G.

Firm Supply at the Utility's 1995 Large User Rate

8,000 kW @	$12.00	=	$96,000	
2,300,000 kW.h @	$0.0405	=	93,150	
2,200,000 kW.h @	$0.0237	=	52,140	
less 8,000 kW @	$0.60	=	(4,800)	Transformer Allowance
Total Bill for Firm Supply		=	$236,490	

Backup Supply

Pass Through of Wholesale Cost	$9,857	
Local Facilities Charge (See Page 4)	2,400	(2,000 x $1.20)
	$12,257	
Total Bill for Firm and Backup Power	$248,747	

Note: Refer to OEB HR22 1995 Rates **"Backup Power Rates for Municipal Utilities and Direct Customers"** or subsequent Ontario Hydro information for details regarding billing procedures.

7. RECOMMENDATIONS

1. The sub-committee recommends that costs associated with connection of a N.U.G. to a municipal utility's distribution system, including costs of protection and additional metering be recovered as a **capital contribution.**

2. It is recommended that costs associated with reserving part of the distribution system to be ready to supply backup to a N.U.G., be recovered in the form of a **facilities charge** applied to the potential backup load on a per kW basis whether backup power is taken or not.

3. The cost of backup power supplied should be recovered using a wholesale backup power rate which removes the risk of coincidence from the municipal utility and provides the benefits of province-wide diversity to the N.U.G.. The daily demand rate also provides an incentive for the N.U.G. to return their generator to service as soon as possible.

4. In order to differentiate between firm supply and backup supply, it is recommended that the generator's output be metered and the difference between the contract demand and the generator's actual output be deemed backup power supplied in any given month. Credit for load shed during generator down time may be applied provided that such load is clearly identified and separately metered.

5. For small N.U.G.'s under 100 kW, it is suggested that application of firm retail rates is an adequate cost recovery method. In some cases, capital contributions, and/or facility charges may be used in conjunction with regular retail rates.

6. In all cases, contractual agreements specifying the calculation of firm power supply quantities, backup power supply quantities, capital contributions, facility charges, backup power rates as well as technical requirements including control, protection, maintenance and safety should be signed between the N.U.G. and the utility.

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