

**RESPONSES TO INTERROGATORIES OF  
SCHOOLS ENERGY COALITION  
EB-2008-0227**

**LIST OF ATTACHMENTS**

<b><u>Appendix</u></b>	<b><u>Content of Appendix</u></b>
SEC_IRR_7-1	2000 EWU-WUC MSA
SEC_IRR_7-2	2000 EWU-EWE MSA
SEC_IRR_10	Balance Sheet Working Capital (2005-2009)
SEC_IRR_14	Pole Top Recloser Analysis
SEC_IRR_15	Information Technology Department Description
SEC_IRR_16	Project Management Office Business Case
SEC_IRR_21	Asset Continuity-Asset Retirement & Other Changes(2007)
SEC_IRR_22	Capital Plan (2006-2008) – Variance Analysis
SEC_IRR_23	Capital Budget Variance Analysis (2006-2007)
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SEC\_IRR\_7-1

The Windsor Utilities Commission

- and -

*ENWIN* Utilities Ltd.

**MANAGEMENT SERVICES AGREEMENT**

Effective: 2000 01 01

*Schedule I amended 2001 01 01*

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## MANAGEMENT SERVICES AGREEMENT

THIS MANAGEMENT SERVICES AGREEMENT is made as of the \_\_\_\_\_ day  
of \_\_\_\_\_, 2000

### B E T W E E N:

The Windsor Utilities Commission, a Commission  
established pursuant to the laws of the Province of Ontario

(hereinafter referred to as "WUC"),

and

ENWIN Utilities Ltd., a corporation incorporated pursuant to  
the laws of the Province of Ontario

(hereinafter referred to as "Utilities"),

### RECITALS

1. The Corporation of the City of Windsor, pursuant to the Section 142 of the *Electricity Act, 1998* caused Utilities to be incorporated on December 13, 1999 to provide administrative and support services to WUC, among others.
2. WUC is a statutory body corporate created by special legislation of the Legislature of Ontario and subject to the provisions of the *Public Utilities Act* and its special legislation.
3. Utilities agrees to provide certain finance, administration, human resources management and other support services, as outlined in the Schedules to this Agreement, to WUC on the terms set forth in this Agreement.

NOW THEREFORE in consideration of the mutual covenants contained herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto hereby agree as follows:

## ARTICLE ONE

### INTERPRETATION

#### Section 1.01 Definitions

Unless the context otherwise specifies or requires, for the purposes of this Agreement all capitalized terms herein shall have the meanings set forth below:

“Advisors” means agents, professional advisors, contractors and subcontractors, and  
“Advisor” means any one of them;

“Affiliate”, with respect to a corporation, shall have the same meaning as is ascribed to such term in the *Business Corporations Act* (Ontario);

“Agreement” “This Agreement”, “The Agreement”, “Management Services Agreement”, “Hereto”, “Hereof”, “Herein”, “Hereby”, “Hereunder” and similar expressions mean this Management Services Agreement together with all Schedules attached hereto, as they may be amended from time to time;

“Business Day” means any day other than a Saturday or Sunday or a statutory or bank holiday in the Province of Ontario;

“Claim” has the meaning ascribed to such term in Section 9.02;

“Confidential Consumer Information” means information Utilities has obtained relating to personal information within the meaning of the *Municipal Freedom of Information Act and Protection of Privacy Act*, “MFOI”;

“Default” means in respect of WUC, an event set out in Section 8.01 and, in respect of Utilities, an event set out in Section 8.02;

“Event of Default” means a Default, the notice and cure periods (if any) respecting which have expired;

“Fees” has the meaning ascribed to such term in Section 5.01;

“Force Majeure Event” has the meaning ascribed to such term in Section 11.02;

“Management Services” has the meaning ascribed to such term in Section 3.01;

“Person” means an individual, corporation, partnership, joint venture, association, trust, pension fund, union, governmental agency, official, board, tribunal, ministry, commission or department;

"Prime Rate" means, in respect of each calendar month, a rate of interest equal to the Prime rate for loans in Canadian dollars as declared by the Canadian Imperial Bank of Commerce as of the first Business Day of such month; and

"Term" has the meaning ascribed thereto in Section 2.01.

#### Section 1.02 Construction of Agreement

In this Agreement:

- (a) words denoting the singular include the plural and vice versa and words denoting any gender include all genders;
- (b) all usage of the word "including" or the phrase "e.g.," in this Agreement shall mean "including, without limitation," throughout this Agreement;
- (c) any reference to a statute shall mean the statute in force as at the date hereof, together with all regulations promulgated thereunder, as the same may be amended, re-enacted, consolidated and/or replaced, from time to time, and any successor statute thereto, unless otherwise expressly provided;
- (d) any reference to a specific executive position or an internal division or department of a Party shall include any successor positions, divisions or departments having substantially the same responsibilities or performing substantially the same functions;
- (e) when calculating the period of time within which or following which any act is to be done or step taken, the date which is the reference day in calculating such period shall be excluded; and if the last day of such period is not a Business Day, the period shall end on the next Business Day;
- (f) all dollar amounts are expressed in Canadian dollars;
- (g) the division of this Agreement into separate Articles, Sections, Subsections and Schedule(s), the provision of a table of contents and the insertion of headings is for convenience of reference only and shall not affect the construction or interpretation of this Agreement;
- (h) words or abbreviations which have well known or trade meanings are used herein in accordance with their recognized meanings;
- (i) the terms and conditions hereof are the result of negotiations between the Parties and the Parties therefore agree that this Agreement shall not be construed in favour



of or against any Party by reason of the extent to which any Party or its professional advisors participated in the preparation of this Agreement.

### Section 1.03 Schedules

The Schedules set out below are attached to and form an integral part of this Agreement:

<u>Schedule</u>	<u>Description</u>
A	Human Resources Management and Support Services
B	Finance and Accounting Services
C	Billing and Collection Services
D	Purchasing and Inventory Management Services
E	Fleet and Site Management Services
F	Information Services
G	Technical and Customer Services
H	Other Services
I	Fees

## ARTICLE TWO TERM

### Section 2.01 Term

The term of this Agreement shall have commenced on the 1<sup>st</sup> day of January 2000 and the terms, conditions and covenants hereof shall have deemed to have been in force and performed by the Parties from that date. The term of this Agreement shall be a period of one year from the 1<sup>st</sup> day of January 2000. On each anniversary of this Agreement, the term shall be extended to an additional one-year period or, for such longer or shorter period as may be agreed in writing by the parties hereto unless terminated earlier in accordance with the terms of this Agreement.

## ARTICLE THREE MANAGEMENT SERVICES

### Section 3.01 Management Services

Subject to the terms, covenants and conditions contained in this Agreement and to the observance and performance by WUC of all terms, covenants and conditions hereof, Utilities will provide or cause to be provided to WUC the following services (collectively, the "Management Services"):

REV. 00 08 14

- (a) the human resources management and support services described in Schedule A;
- (b) the finance and accounting services described in Schedule B;
- (c) the billing and collection services described in Schedule C;
- (d) the purchasing and inventory management services described in Schedule D;
- (e) the fleet and site management services described in Schedule E;
- (f) the information services described in Schedule F;
- (g) the technical and customer services described in Schedule G; and
- (h) other services as described in Schedule H.

#### Section 3.02 Provision of Management Services

Utilities shall have sole supervision and direction in respect of the provision of the Management Services and the methods employed in providing the same.

#### Section 3.03 Relationship

In providing the Management Services, it is specifically understood that Utilities is an independent contractor and not an agent or employee of WUC. As such, except as permitted by this Agreement, Utilities shall not be authorized to bind or commit WUC, either actually or apparently, in any manner whatsoever without the prior written authority from WUC to do so.

#### Section 3.04 Changes

WUC may, from time to time, request modifications to the Management Services, and Utilities agrees to consider such requests, acting reasonably. If Utilities accepts a request for modification to the Management Services, the Parties shall negotiate appropriate changes to the descriptions of the Management Services, the terms and conditions for the provision of those modified Management Services and the Fees in connection with such changes and shall initial and attach amended schedules hereto.

Utilities may, from time to time, request modifications to the Management Services, and WUC agrees to consider such requests, acting reasonably. If WUC accepts a request for modification to the Management Services, the Parties shall negotiate appropriate changes to the descriptions of the Management Services, the terms and conditions for the provision of those modified Management Services and the Fees in connection with such changes and shall initial and attach amended schedules hereto.

In the event that WUC and Utilities are unable to negotiate the appropriate modifications, the Mayor of the City of Windsor shall determine the appropriate modifications in accordance with the provisions of Section 11.03.

In the event of any modification, this Agreement shall continue in force and be amended in accordance with the said modification.

#### ARTICLE FOUR RESPONSIBILITIES OF WUC

##### Section 4.01 Access and Co-operation

In performance of the Management Services outlined in the Schedules to this Agreement, Utilities will maintain all relevant records, including employee records, on behalf of WUC. WUC will grant reasonable access by Utilities' advisors to WUC's facilities and records, including employee records, as may be necessary in connection with the provision of the Management Services. Confidential consumer information in the possession of Utilities on behalf of WUC shall not be released to any third party, inclusive of any affiliate, without the written approval of WUC or said customer and subject to the provisions of the *MFOI*, unless compelled by legal process. WUC will, at its own expense, cooperate with and provide all reasonable assistance as Utilities may request, from time to time, to facilitate delivery of the Management Services.

##### Section 4.02 Confidentiality Arrangements

In fulfilling their obligations under this Agreement, neither Utilities nor WUC shall do any act inconsistent with the confidentiality arrangements as stated in Section 4.01 of this Agreement.

##### Section 4.03 Maintain Records

Utilities will maintain such records as may be necessary in connection with the Management Services and as are agreed upon by the Parties, acting reasonably.

##### Section 4.04 Notification of Changes of Circumstances

WUC shall promptly notify Utilities of any changes or prospective changes in circumstances that would materially affect the resources required for the performance of the Management Services, including any anticipated material change in the nature or level of business of WUC, the number of employees of WUC, or any efforts relating to the organization of or collective bargaining by employees of WUC.

#### Section 4.05 Notice of Claims, Etc.

WUC shall promptly give notice to Utilities, and Utilities shall promptly give notice to WUC, of all actual or potential claims, proceedings, notice of regulatory non-compliance from any regulatory authority, disputes (including labour disputes) or litigation which it reasonably believes could have a adverse effect on the fulfillment of any of the terms hereof by WUC or Utilities (whether or not any such claim, proceeding, dispute or litigation is covered by insurance) in respect of its own operations of which any of them is aware. Each Party shall provide the other Party with all information reasonably requested from time to time concerning the status of such claims, proceedings, notices, disputes, or litigation, and any developments relating thereto.

### ARTICLE FIVE FEES AND PAYMENTS

#### Section 5.01 Fees

In consideration of the provision of the Management Services, WUC shall pay monthly to Utilities fees consisting of the amounts set out in Schedule I. The obligation of WUC to pay Utilities fees shall be effective from the 1<sup>st</sup> day of January 2000.

#### Section 5.02 Payment

Upon the performance of Management Services to WUC, Utilities shall submit to WUC a monthly invoice, which shall be reasonably detailed and itemized, in respect of such service(s).

Within thirty (30) days from WUC's receipt of such invoice, WUC shall pay the invoice(s) in full submitted by Utilities by direct deposit to any account designated by Utilities.

#### Section 5.03 Adjustment to the Fees

The Parties acknowledge that the Fees have been established to reflect the costs to Utilities of providing the Management Services, as outlined in the Schedules to this Agreement, to WUC (including a reasonable rate of return). Throughout the term of this Agreement, and on each anniversary, the amounts or Fees payable hereunder can be adjusted as agreed upon by the Utilities and WUC acting in good faith for the balance of the term, or for the following year, and such adjustments shall be set forth in revised versions of the applicable Schedule which, when so amended, shall be deemed to constitute part of this Agreement for all purposes hereof. In the event that WUC and Utilities are unable to agree upon any adjustment, the Mayor of the City of Windsor shall determine the appropriate adjustment in accordance with the provisions of Section 11.03.

#### Section 5.04 Taxes

In addition to the Fees, WUC shall pay to Utilities an amount equal to any and all goods and services taxes, sales taxes, value-added taxes or any other taxes (excluding income taxes) properly exigible on the supply of the Management Services provided for under this Agreement.

#### Section 5.05 Late Payment

If WUC fails to pay any amounts payable hereunder when due, such unpaid amounts shall bear interest from the due date thereof to the date of payment at Prime Rate plus three percent (3%).

### ARTICLE SIX REPRESENTATIONS AND WARRANTIES

#### Section 6.01 Representations and Warranties of Utilities

Utilities hereby represents and warrants to WUC as follows and acknowledges that WUC is relying on such representations and warranties in connection herewith:

- (a) Utilities is a corporation, duly incorporated, validly existing and in good standing under the laws of the Province of Ontario and it has the rights, powers and privileges to execute and deliver this Agreement and to perform its obligations hereunder;
- (b) the execution, delivery and performance of this Agreement has been duly authorized by all necessary corporate action;
- (c) this Agreement has been duly executed and delivered by Utilities and constitutes a legal, valid and binding obligation of Utilities, enforceable against Utilities by WUC in accordance with its terms; and
- (d) Utilities has the necessary resources and expertise to perform the Management Services.

#### Section 6.02 Representations and Warranties of WUC

WUC hereby represents and warrants to Utilities as follows and acknowledges that Utilities is relying on such representations and warranties in connection herewith:

- (a) WUC is a Commission, duly organized, validly existing and in good standing under the laws of the Province of Ontario and it has the rights, powers and privileges to execute and deliver this Agreement and to perform its obligations hereunder;

- (b) the execution, delivery and performance of this Agreement has been duly authorized by all necessary corporate actions; and
- (c) this Agreement has been duly executed and delivered by WUC and constitutes a legal, valid and binding obligation of WUC, enforceable against WUC by Utilities in accordance with its terms.

## ARTICLE SEVEN INDEMNIFICATION

### Section 7.01 Indemnification by WUC

WUC shall indemnify Utilities, and its respective officers and directors, from any liabilities and damages (including taxes and related penalties) and all related costs and expenses, including reasonable legal fees on a solicitor and client basis and expenses and costs of litigation, settlement, judgment, appeal, interest and penalties ("Losses") arising out of or relating to:

- (a) any claim for Losses by Advisors, customers or suppliers of WUC arising from or related to this Agreement or the Management Services, provided that such claim for Losses does not arise from the acts or omissions of Utilities for which Utilities is found liable in tort or contract; and
- (b) any claim based on the personal or bodily injury (including death) or damage to property received or sustained by any reason of any act or omission, whether negligent or otherwise, to the extent caused by WUC or a WUC Advisor at any WUC location in the course of or in connection with the performance of the Management Services.

### Section 7.02 Indemnification Procedures

If any third party makes a claim covered by Section 7.01 against any indemnitee hereunder (an "Indemnitee") with respect to which such Indemnitee intends to seek indemnification under Section 7.01, such Indemnitee shall give notice of such claim to the indemnifying Party (the "Indemnifying Party") as soon as practicable, including a brief description of the amount and basis therefor, if known. Each Party shall co-operate fully with the other Party in its defence of any such claim. The indemnity obligations of an Indemnifying Party under Section 7.01 shall be conditional on notice of the claim having been provided and the Indemnifying Party having had the opportunity to consult with the Indemnitee regarding the claim. An Indemnitee seeking indemnification hereunder in respect of a claim shall not settle such claim without prior approval of the Indemnitor.

## ARTICLE EIGHT DEFAULT

### Section 8.01 Default by WUC

The occurrence of any one or more of the following events shall constitute a Default by WUC under this Agreement and shall constitute an Event of Default if such Default is not remedied prior to the expiry of the relevant notice period (if any) and the relevant cure period (if any) applicable to such Default as hereinafter set out:

- (a) if WUC defaults in the payment of any amount due to Utilities under this Agreement and such default shall continue unremedied for thirty (30) days following notice thereof to WUC by Utilities; and
- (b) if WUC fails in any material respect to perform or observe any of its other material obligations under this Agreement and such failure shall continue unremedied for a period of thirty (30) days following notice thereof (giving particulars of the failure in reasonable detail) from Utilities to WUC or such longer period as may be reasonably necessary to cure such failure (if such failure is capable of being cured), provided that:
  - (i) WUC proceeds with all due diligence to cure or cause to be cured such failure;
  - (ii) WUC's proceedings can be reasonably expected to cure or cause to be cured such failure within a reasonable time frame acceptable to Utilities, acting reasonably; and

provided that Defaults relating to failures that are incapable of being cured shall not give rise to a right to terminate this Agreement if WUC proceeds with all due diligence to prevent such failures from re-occurring and WUC's proceedings can reasonably be expected to prevent such failures from reoccurring within a reasonable time frame acceptable to Utilities, acting reasonably.

### Section 8.02 Default by Utilities

It shall constitute a Default by Utilities under this Agreement and shall constitute an Event of Default if such Default is not cured prior to the expiry of the relevant notice period (if any) and the relevant cure period (if any) applicable to such Default as hereinafter set out if Utilities fails in any material respect to perform or observe any of its respective material obligations under this Agreement, and such failure shall continue unremedied for a period of thirty (30) days following notice thereof (giving particulars of the failure in reasonable detail) from Energy to Utilities or such longer period as may be reasonably necessary to cure such failure (if such failure is capable of being cured), provided that:

- (a) Utilities proceeds with all due diligence to cure or cause to be cured such failure;
- (b) Utilities' proceedings can be reasonably expected to cure or cause to be cured such failure within a reasonable time frame acceptable to WUC, acting reasonably; and

provided that Defaults relating to failures that are incapable of being cured shall not give rise to a right to terminate this Agreement if Utilities proceeds with all due diligence to prevent such failures from re-occurring and Utilities' proceedings can reasonably be expected to prevent such failures from reoccurring within a reasonable time frame acceptable to WUC, acting reasonably.

## ARTICLE NINE REMEDIES

### Section 9.01 Termination on Default

Upon the occurrence of an Event of Default under this Agreement, either by WUC or Utilities, the Party not in Default hereunder shall, subject to the approval of the Mayor of the City of Windsor, have all its remedies available at law or in equity and shall be entitled to immediately terminate this Agreement upon written notice to the Party in Default.

### Section 9.02 Remedies

Unless otherwise agreed to in writing, in the event of a failure of Utilities to perform Management Services hereunder (a "Claim"), WUC's sole and exclusive remedies and Utilities' entire obligations hereunder shall be to perform or re-perform the Management Services that are the subject of the Claim.

### Section 9.03 Limitation of Liability

For breach or Default by Utilities under or related to this Agreement, Utilities' entire aggregate liability, regardless of the form of action, whether based on contract or tort, including negligence and including, without limitation, the furnishing, the failure to furnish or the quality of any Management Services, shall in no event exceed the amount paid by WUC for the Management Services that is the subject of the claim.

### Section 9.04 No Consequential Damages

In no event will Utilities be liable to WUC, or WUC be liable to Utilities for special, incidental, indirect or consequential loss or damage, lost business revenue, loss of profits, failure to realize expected profits or savings, or any damages or losses pursuant to claims brought by a third party (even if the Party causing such loss or damage has been advised of the possibility of same) in connection with this Agreement.



## ARTICLE TEN TERMINATION

### Section 10.01 Termination

This Agreement shall terminate:

- (a) in accordance with the provisions of Section 9.01; or
- (b) in accordance with Section 2.01.

### Section 10.02 Notification of Termination

Any termination hereof pursuant to Section 10.01 shall be by written notice of the terminating Party, stating the basis on which termination occurs.

### Section 10.03 Liability Continues

Notwithstanding the termination of this Agreement, whether as a result of an Event of Default or otherwise, each Party shall remain liable to the others in accordance with the provisions hereof for any breach or Default arising hereunder prior to such termination.

## ARTICLE ELEVEN GENERAL

### Section 11.01 Change of Control

In the event that WUC ceases to be a public utilities commission, the Parties agree to negotiate diligently and in good faith any amendments to this Agreement necessary or advisable in connection with such event.

### Section 11.02 Force Majeure

No Party shall be liable for a failure or delay in the performance of its obligations pursuant to this Agreement:

- (a) provided that such failure or delay could not have been prevented by reasonable precautions;
- (b) provided that such failure or delay cannot reasonably be circumvented by the non-performing Party through the use of alternate sources, work around plans or other means; and

- (c) if and to the extent such failure or delay is caused, directly or indirectly, by fire, flood, earthquake, elements of nature or acts of God, acts of war, terrorism, riots, civil disorders, rebellions, strikes, lock outs or labour disruptions or revolutions in Canada, or any other similar causes beyond the reasonable control of such Party,

(each, a "Force Majeure Event"). Upon the occurrence of a Force Majeure Event, the non-performing Party shall be excused from any further performance of those of its obligations pursuant to this Agreement affected by the Force Majeure Event only for so long as:

- (d) such Force Majeure Event continues; and
- (e) such Party continues to use commercially reasonable efforts to recommence performance whenever and to whatever extent possible without delay.

The Party delayed by a Force Majeure Event shall:

- (f) immediately notify the other Parties in the manner prescribed by Section 11.05 of the occurrence of a Force Majeure Event; and
- (g) describe in reasonable detail the circumstances causing the Force Majeure Event.

#### Section 11.03 Dispute Resolution

If any dispute arising in relation to any of the terms of this Agreement or its implementation cannot be resolved by negotiation between Utilities and WUC, then the dispute shall be referred to the Mayor of the City of Windsor for decision. The decision of the Mayor of the City of Windsor shall be final and binding and from which there shall be no appeal.

#### Section 11.04 Assignment

Neither Utilities or WUC shall, without the approval of the Mayor of the City of Windsor, assign or transfer its interest in this Agreement. This Agreement shall be binding on the Parties and their respective successors and permitted assigns. Any purported assignment in contravention of this section shall be void.

#### Section 11.05 Notices

All notices, requests, approvals, consents and other communications required or permitted under this Agreement shall be in writing and addressed as follows:

- (a) if to Utilities,

787 Ouellette Avenue  
P.O. Box 1625, Station "A",  
Windsor, Ontario  
N9A 5T7  
Attention: Kent L. Edwards, President  
Fax: 519-255-2767

- (b) if to WUC,

4545 Rhodes Drive  
P.O. Box 1625, Station "A",  
Windsor, Ontario  
N9A 5T7  
Attention: Kent L. Edwards, General Manager  
Fax: 519-255-2767

and shall be sent by fax and the Party sending such notice shall telephone to confirm receipt. A copy of any such notice shall also be sent on the date such notice is transmitted by fax by registered express mail or courier with the capacity to verify receipt of delivery. Any Party may change its address or fax number for notification purposes by giving the other Party notice of the new address or fax number and the date upon which it will become effective in accordance with the terms of this Section 11.05. A notice shall be deemed to have been received as of the next Business Day following its transmission by fax.

#### Section 11.06 Severability

If any provision of this Agreement is held by a court of competent jurisdiction to be unenforceable or contrary to law, then the remaining provisions of this Agreement, or the application of such provisions to persons or circumstances other than those as to which it is invalid or unenforceable shall not be affected thereby, and each such provision of this Agreement shall be valid and enforceable to the extent granted by law.

#### Section 11.07 Waiver

No delay or omission by a Party to exercise any right or power it has under this Agreement or to object to the failure of any covenant of any other Party to be performed in a timely and complete manner, shall impair any such right or power or be construed as a waiver of any succeeding breach or any other covenant. All waivers must be in writing and signed by the Party waiving its rights.

#### Section 11.08 Entire Agreement

This Agreement constitutes the entire Agreement among the Parties with respect to the Management Services, and there are no other representations, understandings or agreements, either oral or written, between the Parties other than as herein set forth.

#### Section 11.09 Amendments

No amendment to, or change, waiver or discharge of any provision of this Agreement shall be valid unless in writing and signed by authorized representatives of each Party.

#### Section 11.10 Governing Law

This Agreement shall be governed by the laws of the Province of Ontario and the laws of Canada applicable therein, excluding their rules governing conflicts of laws. The Parties hereby agree that the courts of the Province of Ontario shall have exclusive jurisdiction over disputes under this Agreement, and the Parties agree that jurisdiction and venue in such courts is appropriate and irrevocably attach to the jurisdiction of such courts.

#### Section 11.11 Survival

The terms of Section 4.02, Section 7, Section 9 and Section 11.03 shall survive the expiration of this Agreement or termination of this Agreement for any reason.

#### Section 11.12 Third Party Beneficiaries

Each Party intends that this Agreement shall not benefit or create any right or cause of action in or on behalf of any person or entity other than the Parties.

#### Section 11.13 Covenant of Further Assurances

The Parties agree that, subsequent to the execution and delivery of this Agreement and without any additional consideration, the Parties shall execute and deliver or cause to be executed and delivered any further legal instruments and perform any acts which are or may become necessary to effectuate the purposes of this Agreement and to complete the transactions contemplated hereunder.

The Windsor Utilities Commission

Per:

Name: Roy Battagello

Title: Chair

(I have the authority to bind the Commission)

Per:

Name: Kent L. Edwards

Title: General Manager

ENWIn Utilities Ltd.

Per:

Name: Kent L. Edwards

Title: President & C.E.O.

(I have the authority to bind the corporation)

Per:

Name: Klass DeGroot

Title: V. P. Financial Services

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## **SCHEDULE A – HUMAN RESOURCES MANAGEMENT AND SUPPORT SERVICES**

The following human resources management and support services shall be provided by *ENWIN* Utilities Ltd. to The Windsor Utilities Commission in accordance with this Agreement:

(a) provision, maintenance and administration of management staffing requirements, including:

- (i) Employee recruitment and selection
- (ii) Organizational employee training and orientation
- (iii) Employee performance and evaluation
- (iv) Compliance with Occupational Health and Safety Act
- (v) Workplace Safety and Insurance Board filings
- (vi) Employee termination
- (vii) Employee retirement
- (viii) Employee master files
- (ix) Dispute resolution / arbitration
- (x) Quality systems (ISO 9001 and Measurements Canada)

(b) administration of the following management compensation requirements:

- (i) Salary benchmarking and determination
- (ii) OMERS Pension Plan
- (iii) Employee Assistance Program
- (iv) Employee Benefits Program

(c) provision, maintenance and administration of unionized staffing requirements, including:

- (i) Employee recruitment and selection
- (ii) Organizational employee training and orientation
- (iii) Employee performance and evaluation
- (iv) Compliance with Occupational Health and Safety Act
- (v) Workplace Safety and Insurance Board filings
- (vi) Worksite safety inspections / safety training
- (vii) Employee termination
- (viii) Employee retirement
- (ix) Employee master files
- (x) Contract interpretation and negotiation
- (xi) Grievance administration / arbitration
- (xii) Quality systems (ISO 9001 and Measurements Canada)

(d) administration of the following unionized employee compensation requirements:

- (i) Contract administration and negotiation – wage rates
- (ii) OMERS Pension Plan
- (iii) Employee Assistance Program
- (iv) Employee Benefits Program

## SCHEDULE B – FINANCE AND ACCOUNTING SERVICES

The following finance and accounting services shall be provided *ENWIN* Utilities Ltd. to The Windsor Utilities Commission in accordance with this Agreement:

- (a) preparation of all financial reports as required, including but not limited to:
  - (i) Annual operating and capital budgets
  - (ii) Monthly reporting package, including monthly and year to date financial statements and variance from budget by category
  - (iii) Special or general purpose reports and analysis as requested
  - (iv) Supporting schedules as required by internal and external auditors
  - (v) Supporting schedules as required to prepare corporate income tax returns
- (b) assistance with other financial needs, including:
  - (i) Cash management
  - (ii) Adequacy and appropriateness of insurance coverage
  - (iii) Processing all daily accounting transactions, including required data entry, payments by due dates and deposits
- (c) administration of periodic management and union payroll, including:
  - (i) Calculation of gross pay and required statutory, contractual, pension, benefit related and miscellaneous deductions per employee, as applicable
  - (ii) Preparation of periodic employee pay stubs and pay cheques / direct deposits
  - (iii) Preparation of periodic remittance forms related to source deductions, Employer Health Tax and Workplace Safety and Insurance Board
  - (iv) Establishment of new employee record on hire
  - (v) Assistance with statutory obligations relating to employee terminations
  - (vi) Payments to all employees
  - (vii) Preparation of all statutory and contractual annual compliance forms including but not limited to, the T4 statement of remuneration reporting forms, the related summary and the Employer Health Tax annual return
- (d) administration of periodic statutory compliance, including:
  - (i) the Federal Goods and Services tax returns and remittances on a monthly basis
  - (ii) Federal and Provincial corporate income tax payments on a monthly and annual basis, as required
  - (iii) funding all payroll related obligations on a periodic basis in conjunction with required compliance deadlines
  - (iv) Annual pension and benefit reporting forms, as required
  - (v) Provincial Retail Sales Tax compliance and application for exemption, as required

### **SCHEDULE C – BILLING AND COLLECTION SERVICES**

The following billing and collection services shall be provided by *ENWIN* Utilities Ltd. to The Windsor Utilities Commission in accordance with this Agreement:

- (a) Maintenance and periodic updating of all customer master files
- (b) Administration of Meter Reading
- (c) Preparation and distribution of monthly invoices
- (d) Payment in full for amounts invoiced on a monthly basis, and acceptance of risk and rewards of ownership of related accounts receivable
- (e) Ensuring rates are in compliance with regulating body



#### **SCHEDULE D – PURCHASING AND INVENTORY MANAGEMENT SERVICES**

The following purchasing and inventory management services shall be provided by *ENWIN* Utilities Ltd. to The Windsor Utilities Commission in accordance with this Agreement:

- (a) Administration of the purchasing function in conjunction with the existing Purchasing Policy, including the following:
  - (i) Coordinate the procurement of all inventory, non-inventory, purchased services, capital and special needs items
  - (ii) Obtain competitive quotes and select the optimal supplier based on the requirements as indicated on the authorized purchase order
  - (iii) Administer the logistics related to the purchases, including shipping, receiving and expediting as required
- (b) Provision of inventory management services, including the following:
  - (i) Control of purchased items, including receipt, warehousing, release and re-stock as required
  - (ii) Monitoring quantities in conjunction with lead times and assistance with requirements planning
  - (iii) Delivery of items to job sites, as required
  - (iv) Allocation of items used to the correct project for accounting purposes and processing required adjustments
- (c) Compliance with all industry and statutory requirements as they apply to purchasing and inventory management, including but not limited to annual testing and certification

#### **SCHEDULE E – FLEET AND SITE MANAGEMENT SERVICES**

The following fleet and site management services shall be provided by *ENWIN* Utilities Ltd. to The Windsor Utilities Commission in accordance with this Agreement:

- (a) Assistance with requirements planning
- (b) Provision of all vehicles and equipment as required to operate
- (c) Provision of the required buildings and facilities to operate

## **SCHEDULE F – INFORMATION SERVICES**

The following information services shall be provided by *ENWIN* Utilities Ltd. to The Windsor Utilities Commission in accordance with this Agreement:

- (a) Assistance with all purchase decisions related to computer hardware and software in conjunction with the Schedule D
- (b) Installation of all required software updates and upgrades, as required
- (c) Coordination of user training, as required
- (d) Provision of a "Help Desk" available for desktop management and trouble shooting during normal business
- (e) Provision and monitoring of company Internet policy
- (f) Security, storage and safekeeping of all electronic data
- (g) Application research related new applicable technology and capacity management

## **SCHEDULE G – TECHNICAL AND CUSTOMER SERVICES**

The following technical and customer services shall be provided by *ENWIN* Utilities Ltd. to The Windsor Utilities Commission in accordance with this Agreement:

- (a) Provision of a call center to accept, log and monitor responses to external requests for service work
- (b) Assistance with aspects of Development Servicing, including:
  - (i) Discussions with developers and their representatives to ensure preliminary engineering plans are in compliance with existing municipal codes and standards
  - (ii) Negotiations with developers and their representatives with respect to required or requested changes to the agreements
  - (iii) Approval of final designs
  - (iv) Ensuring that adequate securities are in place
- (c) Provision of meter testing, repair and accreditation services in compliance with all statutory requirements, as requested
- (d) Provision of meter reading services, including periodic and single purpose reads, as required
- (e) Control over accuracy and integrity of meter data as it relates to billing, settlement, water management and planning, and provision of general and special purpose reports, as required
- (f) Control over accuracy and integrity of account master files, including processing required changes and updates for names, addresses, meter specific information and deposits held on account (where applicable)
- (g) Monitor the development of and updates to the company website, and assist in the development and implementation of electronic commerce and external communication strategies
- (h) Perform, document and report the results of all required regulatory water testing, including sampling on a continuous basis, as required

## **SCHEDULE H – OTHER SERVICES**

The following services shall be provided by *ENWIN* Utilities Ltd. to The Windsor Utilities Commission in accordance with this Agreement:

### **A) Corporate Services**

- (i) Sorting and delivering all incoming mail and coordinating the posting and processing of outgoing mail
- (ii) Forms management, including design as required
- (iii) Control over office supplies inventory, including disbursements to all areas
- (iv) Supply of Records Management System, providing for coding, tracking, storage, retention and purging in compliance with all governmental standards and requirements
- (v) Coordinate communication with the Board of Directors and shareholder, as required
- (vi) Coordinate communication with outside legal counsel on general corporate issues, as required
- (vii) Provide corporate secretary and official witness services, as required
- (viii) Freedom of Information coordinator, as required
- (ix) Provide President and CEO services, as required

*revised Jan 1/2001*

#### **SCHEDULE I - FEES**

Fees for the services as described in the Agreement shall be calculated on a cost-based price, with cost being defined as the cost of providing the services, as incurred by Utilities, including an agreed upon rate of return.

Base monthly fees shall be \$ 634,500, based on an allocation of the 2000 budgeted costs to be incurred by Utilities, as follows:

<b>Departmental Services</b>	<b>Monthly Fee</b>
Human Resources Management and Support Services	\$ 17,800
Finance and Accounting Services	56,750
Billing and Collection Services	161,225
Purchasing and Inventory Management Services	69,575
Fleet and Site Management Services	58,300
Information Services	48,000
Technical and Customer Services	212,050
Corporate Services	10,800
	<hr/>
	<u>\$ 634,500</u>

Actual annual costs shall be calculated by the end of the second month following the completion of the calendar year, or the early termination, of the agreement. Actual costs shall be subject to an external audit by the Auditors of WUC and the fees earned by Utilities shall be reconciled to the fees received by Utilities during the corresponding period. Any and all adjustments as calculated shall be remedied in cash within 30 days.

SEC\_IRR\_7-2

**ENWIN Energy Ltd.**

- and -

**ENWIN Utilities Ltd.**

- and -

**Windsor Canada Utilities Ltd.**

## **MANAGEMENT SERVICES AGREEMENT**

Effective: 2000 01 01



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## MANAGEMENT SERVICES AGREEMENT

THIS MANAGEMENT SERVICES AGREEMENT is made as of the \_\_\_\_\_ day of \_\_\_\_\_, 2000

BETWEEN:

*ENWIN* Energy Ltd., a corporation incorporated pursuant to the laws of the Province of Ontario

(hereinafter referred to as "Energy"),

and

*ENWIN* Utilities Ltd., a corporation incorporated pursuant to the laws of the Province of Ontario

(hereinafter referred to as "Utilities"),

and

Windsor Canada Utilities Ltd., a corporation incorporated pursuant to the laws of the Province of Ontario and the sole shareholder of Energy and Utilities

(hereinafter referred to as "WCU")

### RECITALS

1. The Corporation of the City of Windsor, pursuant to the Section 142 of the *Electricity Act, 1998*, caused Energy to be incorporated on December 13, *1999 to carry on a retail and marketing business* and caused Utilities to be incorporated on December 13, 1999 to provide administrative and support services to Energy, among others.

2. Utilities agrees to provide certain finance, administration, human resources management and other support services, as outlined in the Schedules to this Agreement, to Energy on the terms set forth in this Agreement.

NOW THEREFORE in consideration of the mutual covenants contained herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto hereby agree as follows:

ARTICLE ONE  
INTERPRETATION

Section 1.01 Definitions

Unless the context otherwise specifies or requires, for the purposes of this Agreement all capitalized terms herein shall have the meanings set forth below:

"Advisors" means agents, professional advisors, contractors and subcontractors, and "Advisor" means any one of them;

"Affiliate", with respect to a corporation, shall have the same meaning as is ascribed to such term in the *Business Corporations Act* (Ontario);

"Agreement" "This Agreement", "The Agreement", "Management Services Agreement", "Hereto", "Hereof", "Herein", "Hereby", "Hereunder" and similar expressions mean this Management Services Agreement together with all Schedules attached hereto, as they may be amended from time to time;

"Business Day" means any day other than a Saturday or Sunday or a statutory or bank holiday in the Province of Ontario;

"Claim" has the meaning ascribed to such term in Section 9.02;

"Confidential Consumer Information" means information Energy has obtained relating to a specific consumer, retailer or generator in the process of providing current or prospective distribution service;

"Default" means in respect of Energy, an event set out in Section 8.01 and, in respect of Utilities, an event set out in Section 8.02;

"Event of Default" means a Default, the notice and cure periods (if any) respecting which have expired;

"Fees" has the meaning ascribed to such term in Section 5.01;

"Force Majeure Event" has the meaning ascribed to such term in Section 11.02;

"Management Services" has the meaning ascribed to such term in Section 3.01;

"Person" means an individual, corporation, partnership, joint venture, association, trust, pension fund, union, governmental agency, official, board, tribunal, ministry, commission or department;

"Prime Rate" means, in respect of each calendar month, a rate of interest equal to the

Prime rate for loans in Canadian dollars as declared by the Canadian Imperial Bank of Commerce as of the first Business Day of such month; and

"Term" has the meaning ascribed thereto in Section 2.01.

#### Section 1.02 Construction of Agreement

In this Agreement:

- (a) words denoting the singular include the plural and vice versa and words denoting any gender include all genders;
- (b) all usage of the word "including" or the phrase "e.g.," in this Agreement shall mean "including, without limitation," throughout this Agreement;
- (c) any reference to a statute shall mean the statute in force as at the date hereof, together with all regulations promulgated thereunder, as the same may be amended, re-enacted, consolidated and/or replaced, from time to time, and any successor statute thereto, unless otherwise expressly provided;
- (d) any reference to a specific executive position or an internal division or department of a Party shall include any successor positions, divisions or departments having substantially the same responsibilities or performing substantially the same functions;
- (e) when calculating the period of time within which or following which any act is to be done or step taken, the date which is the reference day in calculating such period shall be excluded; and if the last day of such period is not a Business Day, the period shall end on the next Business Day;
- (f) all dollar amounts are expressed in Canadian dollars;
- (g) the division of this Agreement into separate Articles, Sections, Subsections and Schedule(s), the provision of a table of contents and the insertion of headings is for convenience of reference only and shall not affect the construction or interpretation of this Agreement;
- (h) words or abbreviations which have well known or trade meanings are used herein in accordance with their recognized meanings;
- (i) the terms and conditions hereof are the result of negotiations between the Parties and the Parties therefore agree that this Agreement shall not be construed in favour of or against any Party by reason of the extent to which any Party or its professional advisors participated in the preparation of this Agreement.

### Section 1.03 Schedules

The Schedules set out below are attached to and form an integral part of this Agreement:

<u>Schedule</u>	<u>Description</u>
A	Human Resources Management and Support Services
B	Finance and Accounting Services
C	Billing and Collection Services
D	Purchasing and Inventory Management Services
E	Fleet and Site Management Services
F	Information Services
G	Technical and Customer Services
H	Other Services
I	Fees

## ARTICLE TWO TERM

### Section 2.01 Term

The term of this Agreement shall have commenced on the 1<sup>st</sup> day of January 2000 and the terms, covenants and conditions hereof shall have deemed to have been in force and performed by the Parties from that date. The term of this Agreement shall continue for a period of one year from the 1<sup>st</sup> day of January 2000. On each anniversary of this Agreement, the term shall be extended to an additional one-year period or, for such longer or shorter period as may be agreed in writing by the parties hereto unless terminated earlier in accordance with the terms of this Agreement.

## ARTICLE THREE MANAGEMENT SERVICES

### Section 3.01 Management Services

Subject to the terms, covenants and conditions contained in this Agreement and to the observance and performance by Energy of all terms, covenants and conditions hereof, Utilities will provide or cause to be provided to Energy the following services (collectively, the "Management Services"):

- (a) the human resources management and support services described in Schedule A;
- (b) the finance and accounting services described in Schedule B;
- (c) the billing and collection services described in Schedule C;

- (d) the purchasing and inventory management services described in Schedule D;
- (e) the fleet and site management services described in Schedule E;
- (f) the information services described in Schedule F;
- (g) the technical and customer services described in Schedule G; and
- (h) other services as described in Schedule H.

### Section 3.02 Provision of Management Services

Utilities shall have sole supervision and direction in respect of the provision of the Management Services and the methods employed in providing the same.

### Section 3.03 Relationship

In providing the Management Services, it is specifically understood that Utilities is an independent contractor and not an agent or employee of Energy or WCU. As such, except as permitted by this Agreement, Utilities shall not be authorized to bind or commit Energy or WCU, either actually or apparently, in any manner whatsoever without the prior written authority from Energy or WCU to do so.

### Section 3.04 Changes

Energy may, from time to time, request modifications to the Management Services, and Utilities agrees to consider such requests, acting reasonably. If Utilities accepts a request for modification to the Management Services, the Parties shall negotiate appropriate changes to the descriptions of the Management Services, the terms and conditions for the provision of those modified Management Services and the Fees in connection with such changes and shall initial and attach amended schedules hereto.

Utilities may, from time to time, request modifications to the Management Services, and Energy agrees to consider such requests, acting reasonably. If Energy accepts a request for modification to the Management Services, the Parties shall negotiate appropriate changes to the descriptions of the Management Services, the terms and conditions for the provision of those modified Management Services and the Fees in connection with such changes and shall initial and attach amended schedules hereto.

In the event that Powerlines and Utilities are unable to negotiate the appropriate changes, WCU shall determine the appropriate changes in accordance with the provisions of Section 11.03.

In the event of any modifications, this Agreement shall continue in force and be amended in accordance with the said modification.

## ARTICLE FOUR RESPONSIBILITIES OF ENERGY

### Section 4.01 Access and Co-operation

In performance of the Management Services outlined in the Schedules to this Agreement, Utilities will maintain all requisite records, including employee records, on behalf of Energy. Energy will grant reasonable access by Utilities' employees and/or advisors to Energy's facilities and records, including employee records, as may be necessary in connection with the provision of the Management Services. Confidential consumer information in the possession of Utilities on behalf of Energy shall not be released to any third party, inclusive of any affiliate, without the written approval of Energy or said customer, unless compelled by legal process. Energy will, at its own expense, cooperate with and provide all reasonable assistance as Utilities may request, from time to time, to facilitate delivery of the Management Services.

### Section 4.02 Confidentiality Arrangements

In fulfilling their obligations under this Agreement, neither Utilities nor Energy shall do any act inconsistent with the confidentiality arrangements as stated in Section 4.01 of this Agreement.

### Section 4.03 Maintain Records

Utilities will maintain such records as may be necessary in connection with the Management Services and as are agreed upon by the Parties, acting reasonably.

### Section 4.04 Notification of Changes of Circumstances

Energy shall promptly notify Utilities of any changes or prospective changes in circumstances that would materially affect the resources required for the performance of the Management Services, including any anticipated material change in the nature or level of business of Energy, the number of employees of Energy, or any efforts relating to the organization of or collective bargaining by employees of Energy.

### Section 4.05 Notice of Claims, Etc.

Energy shall promptly give notice to Utilities, and Utilities shall promptly give notice to Energy, of all actual or potential claims, proceedings, notice of regulatory non-compliance from any regulatory authority, disputes (including labour disputes) or litigation which it reasonably believes could have an adverse effect on the fulfillment of any of the terms hereof by Energy or Utilities (whether or not any such claim, proceeding, dispute or litigation is covered by insurance) in respect of its own operations of which any of them is aware. Each Party shall provide the other Party with all information reasonably requested from time to time concerning the status of such claims, proceedings, notices, disputes, or litigation, and any developments relating thereto.



## ARTICLE FIVE FEES AND PAYMENTS

### Section 5.01 Fees

In consideration of the provision of the Management Services, Energy shall pay monthly to Utilities fees consisting of the amounts set out in Schedule I. The obligation of Energy to pay the Utilities fees shall be effective from the 1<sup>st</sup> day of January 2000.

### Section 5.02 Payment

Upon the performance of Management Services to Energy, Utilities shall submit to Energy a monthly invoice, which shall be reasonably detailed and itemized, in respect of such service(s).

Within thirty (30) days from Energy's receipt of such invoice, Energy shall pay the invoice(s) in full submitted by Utilities by direct deposit to any account designated by Utilities.

### Section 5.03 Adjustment to the Fees

The Parties acknowledge that the Fees have been established to reflect the costs to Utilities of providing the Management Services, as outlined in the Schedules to this Agreement, to Energy (including a reasonable rate of return). Throughout the term of this Agreement, and on each anniversary, the amounts or Fees payable hereunder can be adjusted as agreed upon by the Utilities and Energy acting in good faith for the balance of the term, or for the following year, and such adjustments shall be set forth in revised versions of the applicable Schedule which, when so amended, shall be deemed to constitute part of this Agreement for all purposes hereof. In the event that Energy and Utilities are unable to agree upon any adjustment, WCU shall determine the appropriate adjustment in accordance with the provisions of Section 11.03.

### Section 5.04 Taxes

In addition to the Fees, Energy shall pay to Utilities an amount equal to any and all goods and services taxes, sales taxes, value-added taxes or any other taxes (excluding income taxes) properly exigible on the supply of the Management Services provided for under this Agreement.

### Section 5.05 Late Payment

If Energy fails to pay any amounts payable hereunder when due, such unpaid amounts shall bear interest from the due date thereof to the date of payment at Prime Rate plus three percent (3%).

ARTICLE SIX  
REPRESENTATIONS AND WARRANTIES

Section 6.01 Representations and Warranties of Utilities

Utilities hereby represents and warrants to Energy as follows and acknowledges that Energy is relying on such representations and warranties in connection herewith:

- (a) Utilities is a corporation, duly incorporated, validly existing and in good standing under the laws of the Province of Ontario and it has the rights, powers and privileges to execute and deliver this Agreement and to perform its obligations hereunder;
- (b) the execution, delivery and performance of this Agreement has been duly authorized by all necessary corporate action;
- (c) this Agreement has been duly executed and delivered by Utilities and constitutes a legal, valid and binding obligation of Utilities, enforceable against Utilities by Energy in accordance with its terms; and
- (d) Utilities has the necessary resources and expertise to perform the Management Services.

Section 6.02 Representations and Warranties of Energy

Energy hereby represents and warrants to Utilities as follows and acknowledges that Utilities is relying on such representations and warranties in connection herewith:

- (a) Energy is a company, duly organized, validly existing and in good standing under the laws of the Province of Ontario and it has the rights, powers and privileges to execute and deliver this Agreement and to perform its obligations hereunder;
- (b) the execution, delivery and performance of this Agreement has been duly authorized by all necessary corporate actions; and
- (c) this Agreement has been duly executed and delivered by Energy and constitutes a legal, valid and binding obligation of Energy, enforceable against Energy by Utilities in accordance with its terms.

## ARTICLE SEVEN INDEMNIFICATION

### Section 7.01 Indemnification by Energy

Energy shall indemnify Utilities, and its respective officers and directors, from any liabilities and damages (including taxes and related penalties) and all related costs and expenses, including reasonable legal fees on a solicitor and client basis and expenses and costs of litigation, settlement, judgment, appeal, interest and penalties ("Losses") arising out of or relating to:

- (a) any claim for Losses by Advisors, customers or suppliers of Energy arising from or related to this Agreement or the Management Services, provided that such claim for Losses do not arise from the acts or omissions of Utilities for which Utilities is found liable in tort or contract; and
- (b) any claim based on the personal or bodily injury (including death) or damage to property received or sustained by any reason of any act or omission, whether negligent or otherwise, to the extent caused by Energy or an Energy Advisor at any Energy location in the course of or in connection with the performance of the Management Services.

### Section 7.02 Indemnification Procedures

If any third party makes a claim covered by Section 7.01 against any indemnitee hereunder (an "Indemnitee") with respect to which such Indemnitee intends to seek indemnification under Section 7.01, such Indemnitee shall give notice of such claim to the indemnifying Party (the "Indemnifying Party") as soon as practicable, including a brief description of the amount and basis therefor, if known. Each Party shall co-operate fully with the other Party in its defence of any such claim. The indemnity obligations of an Indemnifying Party under Section 7.01 shall be conditional on notice of the claim having been provided and the Indemnifying Party having had the opportunity to consult with the Indemnitee regarding the claim. An Indemnitee seeking indemnification hereunder in respect of a claim shall not settle such claim without prior approval of the Indemnitor.

## ARTICLE EIGHT DEFAULT

### Section 8.01 Default by Energy

The occurrence of any one or more of the following events shall constitute a Default by Energy under this Agreement and shall constitute an Event of Default if such Default is not remedied prior to the expiry of the relevant notice period (if any) and the relevant cure period (if any) applicable to such Default as hereinafter set out:

- (a) if Energy defaults in the payment of any amount due to Utilities under this Agreement and such default shall continue unremedied for thirty (30) days following notice thereof to Energy by Utilities; and
- (b) if Energy fails in any material respect to perform or observe any of its other material obligations under this Agreement and such failure shall continue unremedied for a period of thirty (30) days following notice thereof (giving particulars of the failure in reasonable detail) from Utilities to Energy or such longer period as may be reasonably necessary to cure such failure (if such failure is capable of being cured), provided that:
  - (i) Energy proceeds with all due diligence to cure or cause to be cured such failure;
  - (ii) Energy's proceedings can be reasonably expected to cure or cause to be cured such failure within a reasonable time frame acceptable to Utilities, acting reasonably; and

provided that Defaults relating to failures that are incapable of being cured shall not give rise to a right to terminate this Agreement if Energy proceeds with all due diligence to prevent such failures from re-occurring and Energy's proceedings can reasonably be expected to prevent such failures from reoccurring within a reasonable time frame acceptable to Utilities, acting reasonably.

#### Section 8.02 Default by Utilities

It shall constitute a Default by Utilities under this Agreement and shall constitute an Event of Default if such Default is not cured prior to the expiry of the relevant notice period (if any) and the relevant cure period (if any) applicable to such Default as hereinafter set out if Utilities fails in any material respect to perform or observe any of its respective material obligations under this Agreement, and such failure shall continue unremedied for a period of thirty (30) days following notice thereof (giving particulars of the failure in reasonable detail) from Energy to Utilities or such longer period as may be reasonably necessary to cure such failure (if such failure is capable of being cured), provided that Utilities:

- (a) Utilities proceeds with all due diligence to cure or cause to be cured such failure;
- (b) Utilities' proceedings can be reasonably expected to cure or cause to be cured such failure within a reasonable time frame acceptable to Energy, acting reasonably; and

provided that Defaults relating to failures that are incapable of being cured shall not give rise to a right to terminate this Agreement if Utilities proceeds with all due diligence to prevent such failures from re-occurring and Utilities' proceedings can reasonably be expected to prevent such failures from reoccurring within a reasonable time frame acceptable to Energy, acting reasonably.

## ARTICLE NINE REMEDIES

### Section 9.01 Termination on Default

Upon the occurrence of an Event of Default under this Agreement, either by Energy or Utilities, the Party not in Default hereunder shall, subject to the approval of WCU, have all its remedies available at law or in equity and shall be entitled to immediately terminate this Agreement upon written notice to the Party in Default.

### Section 9.02 Remedies

Unless otherwise agreed to in writing, in the event of a failure of Utilities to perform Management Services hereunder (a "Claim"), Energy's sole and exclusive remedies and Utilities' entire obligations hereunder shall be to perform or re-perform the Management Services that are the subject of the Claim.

### Section 9.03 Limitation of Liability

For breach or Default by Utilities under or related to this Agreement, Utilities' entire aggregate liability, regardless of the form of action, whether based on contract or tort, including negligence and including, without limitation, the furnishing, the failure to furnish or the quality of any Management Services, shall in no event exceed the amount paid by Energy for the Management Services that is the subject of the claim.

### Section 9.04 No Consequential Damages

In no event will Utilities be liable to Energy, or Energy be liable to Utilities for special, incidental, indirect or consequential loss or damage, lost business revenue, loss of profits, failure to realize expected profits or savings, or any damages or losses pursuant to claims brought by a third party (even if the Party causing such loss or damage has been advised of the possibility of same) in connection with this Agreement.

## ARTICLE TEN TERMINATION

### Section 10.01 Termination

This Agreement shall terminate:

- (a) in accordance with the provisions of Section 9.01; or
- (b) in accordance with Section 2.01.

### Section 10.02 Notification of Termination

Any termination hereof pursuant to Section 10.01 shall be by written notice of the terminating Party, stating the basis on which termination occurs.

### Section 10.03 Liability Continues

Notwithstanding the termination of this Agreement, whether as a result of an Event of Default or otherwise, each Party shall remain liable to the others in accordance with the provisions hereof for any breach or Default arising hereunder prior to such termination.

## ARTICLE ELEVEN GENERAL

### Section 11.01 Change of Control

In the event that Energy ceases to be an Affiliate of Utilities, the Parties agree to negotiate diligently and in good faith any amendments to this Agreement necessary or advisable in connection with such event. Energy acknowledges that Utilities may be unable to provide certain of the Management Services in the event that Energy ceases to be an Affiliate of Utilities.

### Section 11.02 Force Majeure

No Party shall be liable for a failure or delay in the performance of its obligations pursuant to this Agreement:

- (a) provided that such failure or delay could not have been prevented by reasonable precautions;

- (b) provided that such failure or delay cannot reasonably be circumvented by the non-performing Party through the use of alternate sources, work around plans or other means; and
- (c) if and to the extent such failure or delay is caused, directly or indirectly, by fire, flood, earthquake, elements of nature or acts of God, acts of war, terrorism, riots, civil disorders, rebellions, strikes, lock outs or labour disruptions or revolutions in Canada, or any other similar causes beyond the reasonable control of such Party,

(each, a "Force Majeure Event"). Upon the occurrence of a Force Majeure Event, the non-performing Party shall be excused from any further performance of those of its obligations pursuant to this Agreement affected by the Force Majeure Event only for so long as:

- (d) such Force Majeure Event continues; and
- (e) such Party continues to use commercially reasonable efforts to recommence performance whenever and to whatever extent possible without delay.

The Party delayed by a Force Majeure Event shall:

- (f) immediately notify the other Parties in the manner prescribed by Section 11.05 of the occurrence of a Force Majeure Event; and
- (g) describe in reasonable detail the circumstances causing the Force Majeure Event.

#### Section 11.03 Dispute Resolution

If any dispute arising in relation to any of the terms of this Agreement or its implementation, including defaults and adjustments, cannot be resolved by negotiation between Utilities and Energy, then the dispute shall be referred to WCU for decision. The decision of WCU shall be final and binding and from which there shall be no appeal. The directors of WCU shall serve as the board of arbitration and shall conduct a hearing in accordance with the provisions of the Arbitrations Act (Ontario), subject to any changes to which the majority of directors agree.

#### Section 11.04 Assignment

Neither Utilities or Energy shall, without the approval of WCU, assign or transfer its interest in this Agreement. This Agreement shall be binding on the Parties and their respective successors and permitted assigns. Any purported assignment in contravention of this section shall be void.

### Section 11.05 Notices

All notices, requests, approvals, consents and other communications required or permitted under this Agreement shall be in writing and addressed as follows:

- (a) if to Utilities,

787 Ouellette Avenue,  
P.O. Box 165-. Station "A"  
Windsor, Ontario  
N9A 5T7  
Attn: Kent L. Edwards, President & CEO  
Fax: 519-255-2767

- (b) if to Energy,

787 Ouellette Avenue  
P.O. Box 1625, Station "A"  
Windsor, Ontario  
N9A 5T7  
Attn: Kent L. Edwards, President  
Fax: 519-255-2767

- (c) if to WCU,

787 Ouellette Avenue  
P.O. Box 1625, Station "A"  
Windsor, Ontario  
N9A 5T7  
Attn: Kent L. Edwards, CEO  
Fax: 519-255-2767

and shall be sent by fax and the Party sending such notice shall telephone to confirm receipt. A copy of any such notice shall also be sent on the date such notice is transmitted by fax by registered express mail or courier with the capacity to verify receipt of delivery. Any Party may change its address or fax number for notification purposes by giving the other Party notice of the new address or fax number and the date upon which it will become effective in accordance with the terms of this Section 11.05. A notice shall be deemed to have been received as of the next Business Day following its transmission by fax.

### Section 11.06 Severability

If any provision of this Agreement is held by a court of competent jurisdiction to be unenforceable or contrary to law, then the remaining provisions of this Agreement, or the application of such provisions to persons or circumstances other than those as to which it is



invalid or unenforceable shall not be affected thereby, and each such provision of this Agreement shall be valid and enforceable to the extent granted by law.

#### Section 11.07 Waiver

No delay or omission by a Party to exercise any right or power it has under this Agreement or to object to the failure of any covenant of any other Party to be performed in a timely and complete manner, shall impair any such right or power or be construed as a waiver of any succeeding breach or any other covenant. All waivers must be in writing and signed by the Party waiving its rights.

#### Section 11.08 Entire Agreement

This Agreement constitutes the entire Agreement among the Parties with respect to the Management Services, and there are no other representations, understandings or agreements, either oral or written, between the Parties other than as herein set forth.

#### Section 11.09 Amendments

No amendment to, or change, waiver or discharge of any provision of this Agreement shall be valid unless in writing and signed by authorized representatives of each Party.

#### Section 11.10 Governing Law

This Agreement shall be governed by the laws of the Province of Ontario and the laws of Canada applicable therein, excluding their rules governing conflicts of laws. The Parties hereby agree that the courts of the Province of Ontario shall have exclusive jurisdiction over disputes under this Agreement, and the Parties agree that jurisdiction and venue in such courts is appropriate and irrevocably attach to the jurisdiction of such courts.

#### Section 11.11 Survival

The terms of Section 7, Section 9 and Section 11.03 shall survive the expiration of this Agreement or termination of this Agreement for any reason.

#### Section 11.12 Third Party Beneficiaries

Each Party intends that this Agreement shall not benefit or create any right or cause of action in or on behalf of any person or entity other than the Parties.

#### Section 11.13 Covenant of Further Assurances

The Parties agree that, subsequent to the execution and delivery of this Agreement and without any additional consideration, the Parties shall execute and deliver or

cause to be executed and delivered any further legal instruments and perform any acts which are or may become necessary to effectuate the purposes of this Agreement and to complete the transactions contemplated hereunder.

ENWIN Energy Ltd.

Per: 

Name: Kent L. Edwards

Title: President & CEO  
(I have the authority to bind the corporation)

Per: 

J. Merlo

Secretary

ENWIN Utilities Ltd.

Per: 

Name: Kent L. Edwards

Title: President & CEO  
(I have the authority to bind the corporation)

Per: 

J. Merlo

Vice President, Corporate Services

Windsor Canada Utilities Ltd.

Per: 

Name: Kent L. Edwards

Title: CEO  
(I have the authority to bind the corporation)

Per: 

J. Merlo

Secretary

INTERNAL DRAFT – FOR DISCUSSION PURPOSES

**SCHEDULE A – HUMAN RESOURCES MANAGEMENT AND SUPPORT SERVICES**

The following human resources management and support services shall be provided by *ENWIN* Utilities Ltd. to *ENWIN* Energy Ltd. in accordance with this Agreement:

(a) provision, maintenance and administration of management staffing requirements, including:

- (i) Employee recruitment and selection
- (ii) Organizational employee training and orientation
- (iii) Employee performance and evaluation
- (iv) Compliance with Occupational Health and Safety Act
- (v) Workplace Safety and Insurance Board filings
- (vi) Employee termination
- (vii) Employee retirement
- (viii) Employee master files
- (ix) Dispute resolution / arbitration
- (x) Quality systems (ISO 9001 and Measurements Canada)

(b) administration of the following management compensation requirements:

- (i) Salary benchmarking and determination
- (ii) OMERS Pension Plan
- (iii) Employee Assistance Program
- (iv) Employee Benefits Program

INTERNAL DRAFT – FOR DISCUSSION PURPOSES

**SCHEDULE B – FINANCE AND ACCOUNTING SERVICES**

The following finance and accounting services shall be provided by *ENWIN* Utilities Ltd. to *ENWIN* Energy Ltd. in accordance with this Agreement:

- (a) preparation of all financial reports as required, including but not limited to:
  - (i) Annual operating and capital budgets
  - (ii) Monthly reporting package, including monthly and year to date financial statements and variance from budget by category
  - (iii) Special or general purpose reports and analysis as requested
  - (iv) Supporting schedules as required by internal and external auditors
  - (v) Supporting schedules as required to prepare corporate income tax returns
- (b) assistance with other financial needs, including:
  - (i) Cash management
  - (ii) Adequacy and appropriateness of insurance coverage
  - (iii) Processing all daily accounting transactions, including required data entry, payments by due dates and deposits
- (c) administration of periodic management and union payroll, including:
  - (i) Calculation of gross pay and required statutory, contractual, pension, benefit related and miscellaneous deductions per employee, as applicable
  - (ii) Preparation of periodic employee pay stubs and pay cheques / direct deposits
  - (iii) Preparation of periodic remittance forms related to source deductions, Employer Health Tax and Workplace Safety and Insurance Board
  - (iv) Establishment of new employee record on hire
  - (v) Assistance with statutory obligations relating to employee terminations
  - (vi) Payments to all employees
  - (vii) Preparation of all statutory and contractual annual compliance forms including but not limited to, the T4 statement of remuneration reporting forms, the related summary and the Employer Health Tax annual return
- (d) administration of periodic statutory compliance, including:
  - (i) the Federal Goods and Services tax returns and remittances on a monthly basis
  - (ii) Federal and Provincial corporate income tax payments on a monthly and annual basis, as required
  - (iii) funding all payroll related obligations on a periodic basis in conjunction with required compliance deadlines
  - (iv) Annual pension and benefit reporting forms, as required
  - (v) Provincial Retail Sales Tax compliance and application for exemption, as required

**INTERNAL DRAFT – FOR DISCUSSION PURPOSES**

**SCHEDULE C – BILLING AND COLLECTION SERVICES**

The following billing and collection services shall be provided by *ENWIN* Utilities Ltd. to *ENWIN* Energy Ltd. in accordance with this Agreement:

- (a) Maintenance and periodic updating of all customer master files
- (b) Administration of Meter Reading
- (c) Preparation and distribution of monthly invoices
- (d) Payment in full for amounts invoiced on a monthly basis, and acceptance of risk and rewards of ownership of related accounts receivable
- (e) Provision of MDMA Services (Meter Data Management Agent), as required

INTERNAL DRAFT – FOR DISCUSSION PURPOSES

**SCHEDULE D – PURCHASING AND INVENTORY MANAGEMENT SERVICES**

The following purchasing and inventory management services shall be provided by *ENWIN* Utilities Ltd. to *ENWIN* Energy Ltd. in accordance with this Agreement:

- (a) Administration of the purchasing function in conjunction with the existing Purchasing Policy, including the following:
  - (i) Coordinate the procurement of all inventory, non-inventory, purchased services, capital and special needs items
  - (ii) Obtain competitive quotes and select the optimal supplier based on the requirements as indicated on the authorized purchase order
  - (iii) Administer the logistics related to the purchases, including shipping, receiving and expediting as required
- (b) Provision of inventory management services, including the following:
  - (i) Control of purchased items, including receipt, warehousing, release and re-stock as required
  - (ii) Monitoring quantities in conjunction with lead times and assistance with requirements planning
  - (iii) Delivery of items to job sites, as required
  - (iv) Allocation of items used to the correct project for accounting purposes and processing required adjustments
- (c) Compliance with all industry and statutory requirements as they apply to purchasing and inventory management

**INTERNAL DRAFT – FOR DISCUSSION PURPOSES**

**SCHEDULE E – FLEET AND SITE MANAGEMENT SERVICES**

The following fleet and site management services shall be provided by *ENWIN* Utilities Ltd. to *ENWIN* Energy Ltd. in accordance with this Agreement:

- (a) Assistance with requirements planning
- (b) Provision of all vehicles and equipment as required to operate
- (c) Provision of the required buildings and facilities to operate

**INTERNAL DRAFT – FOR DISCUSSION PURPOSES**

**SCHEDULE F – INFORMATION SERVICES**

The following information services shall be provided by *ENWIN* Utilities Ltd. to *ENWIN* Energy Ltd. in accordance with this Agreement:

- (a) Assistance with all purchase decisions related to computer hardware and software in conjunction with the Schedule D
- (b) Installation of all required software updates and upgrades, as required
- (c) Coordination of user training, as required
- (d) Provision of a "Help Desk" available for desktop management and trouble shooting during normal business
- (e) Provision and monitoring of company Internet policy
- (f) Security, storage and safekeeping of all electronic data
- (g) Application research related new applicable technology and capacity management



INTERNAL DRAFT – FOR DISCUSSION PURPOSES

**SCHEDULE G – TECHNICAL AND CUSTOMER SERVICES**

The following technical and customer services shall be provided by *ENWIN* Utilities Ltd. to *ENWIN* Energy Ltd. in accordance with this Agreement:

- (a) Provision of a call center to accept, log and monitor responses to external requests for service work
- (b) Provision of meter testing, repair, installation, removal and accreditation services in compliance with all statutory requirements, including licensed MSP Services (Meter Service Provider)
- (c) Provision of meter reading services, including periodic and single purpose reads, as required
- (d) Control over accuracy and integrity of meter data as it relates to billing, settlement, energy management and planning, and provision of general and special purpose reports, as required
- (e) Control over accuracy and integrity of account master files, including processing required changes and updates for names, addresses, meter specific information and deposits held on account (where applicable)
- (f) Monitor the development of and updates to the company website, and assist in the development and implementation of electronic commerce and external communication strategies

**INTERNAL DRAFT – FOR DISCUSSION PURPOSES**

**SCHEDULE H – OTHER SERVICES**

The following services shall be provided by *ENWIN* Utilities Ltd. to *ENWIN* Energy Ltd. in accordance with this Agreement:

**A) Corporate Services**

- (i) Sorting and delivering all incoming mail and coordinating the posting and processing of outgoing mail
- (ii) Forms management, including design as required
- (iii) Control over office supplies inventory, including disbursements to all areas
- (iv) Supply of Records Management System, providing for coding, tracking, storage, retention and purging in compliance with all governmental standards and requirements
- (v) Coordinate communication with the Board of Directors and shareholder, as required
- (vi) Coordinate communication with outside legal counsel on general corporate issues, as required
- (vii) Provide corporate secretary and official witness services, as required
- (viii) Provide President and CEO services, as required

**INTERNAL DRAFT – FOR DISCUSSION PURPOSES****SCHEDULE I – FEES**

Fees for the services as described in the Agreement shall be calculated on a cost-based price, with cost being defined as the cost of providing the services, as incurred by Utilities, including an agreed upon rate of return.

Base monthly fees shall be \$30,500, based on an allocation of the 2000 budgeted costs to be incurred by Utilities, as follows:

<b>Departmental Services</b>	<b>Monthly Fee</b>
Human Resources Management and Support Services	\$ 300
Finance and Accounting Services	1,000
Billing and Collection Services	300
Purchasing and Inventory Management Services	200
Fleet and Site Management Services	-
Information Services	300
Technical and Customer Services	17,600
Corporate Services	10,800
	<hr/>
	<b>\$ 30,500</b>

Actual annual costs shall be calculated by the end of the second month following the completion of the calendar year, or the early termination, of the agreement. Actual costs shall be subject to an external audit by the Auditors of Energy and the fees earned by Utilities shall be reconciled to the fees received by Utilities during the corresponding period. Any and all adjustments as calculated shall be remedied in cash within 30 days.

SEC\_IRR\_10

Actual Working Capital from the Balance Sheet  
(defined as current assets less current liabilities)

	<b>2005 Actual</b>	<b>2006 Actual</b>	<b>2007 Actual</b>	<b>2008 Forecast</b>	<b>2009 * Projected</b>
Current Assets	46,382,855	37,999,487	39,006,714	43,753,339	43,582,503
Current Liabilities	69,833,082	56,546,114	50,658,927	55,981,435	54,675,845
Working Capital	<u>(23,450,227)</u>	<u>(18,546,627)</u>	<u>(11,652,213)</u>	<u>(12,228,096)</u>	<u>(11,093,342)</u>

\* based on existing rates

SEC\_IRR\_14



## **Reliability Improvement Recloser Loop Scheme Implementation**

Prepared by: Shawn Filice

April 3, 2006

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## **Executive Summary**

The City of Windsor requires an affordable and reliable electrical energy distribution system to encourage investment and create economic benefits for the area. This report reviews system reliability in general terms, compares ENWIN's reliability indices against other large utilities in the province and concludes that continued capital spending for recloser installations is required to ensure that system reliability does not diminish. The reader is encouraged to understand the challenges and opportunities facing Powerlines as outlined in this report.

The average age of the existing *ENWIN* Powerlines distribution infrastructure is 30 to 40 years and the average life of distribution infrastructure is approximately 40 to 50 years, based on published reports. Eliminating or substantially reducing capital expenditures necessary to replace deteriorated infrastructure would translate into reduced distribution reliability and increased maintenance expenses. This will result in decreased customer satisfaction and a potential loss of jobs in this increasingly competitive manufacturing market.

As *EnWIN*'s infrastructure continues to age, the probability of equipment failure continues to increase. A looped scheme recloser will automatically restore power to a part of a feeder after a fault condition has occurred and resulted in a power outage. The use of pole-mounted reclosers in a looped configuration can expedite power restoration initiatives and improve reliability statistics while reducing operating and maintenance costs. Similar protective schemes are becoming commonplace amongst Utilities across North America.

The report recommends funding the implementation of a loop scheme distribution automation program for the following reasons:

- It is the option that best balances cost with reliability improvements;
- Improve reliability by 10% & move from a bottom Quartile performer to a Third Quartile performer, just two places behind Horizon (Hamilton) Utilities;
- Reduce outage costs to our large industrial customers by \$1.1 Million/year.

## **Local Development and Industry Needs**

The City of Windsor decided to maintain ownership of the distribution assets to ensure affordable and reliable power for industry and residential consumers and to use distribution infrastructure as an asset that can be leveraged to create economic development in the area.

Windsor's high density of manufacturing plants requires reliable power in order to effectively compete in the highly competitive global environment. Power outages, whether short or long in duration, create industry down time, scrap, and lost production since many of the manufacturing processes are highly automated and microprocessor based. The OEB Performance Based Regulation (PBR) has been structured to ensure reliability is not sacrificed for the sake of increased profits. Phase two of PBR will mandate continuous improvement in reliability and service quality levels. OEB working groups have been established to define the service and productivity factors that will be considered. Additionally, local distribution rates must remain competitive in order to ensure that local industry is competitive. A balance must be maintained between distribution rates and the cost of reliability.

## **Introduction & Purpose**

The purpose of the EnWin Powerlines organization is to provide safe, reliable, cost effective electricity to the end use customers and at the same time increase the value of the asset for the shareholder. The shareholder (City Of Windsor) wanted to utilize the asset to successfully enhance economic development in the City of Windsor. When evaluating a prospective site, industry places a high emphasis on electricity reliability and price. The reliability of the electrical distribution system together with the price of electricity (delivery as well as commodity) are primary drivers in the decision making process on whether to locate a heavy manufacturing facility in the region. This is especially true for high energy load operations such as galvanizing and metal casting plants where the impact of interrupted power has severe consequences in the shutdown, purging/waste of material in process and restarting of production. Please refer to Appendix F for a discussion of the issues large manufacturers must consider when evaluating prospective sites.

The EnWin customer base consists of approximately 85,000 residential, commercial, and industrial customers. The Windsor - Essex County area has one of the highest densities of manufacturing industries in Canada. The industrial customers are primarily manufacturing plants that are either directly or indirectly involved in the automotive industry and are using just in time (JIT) processes to compete in this extremely competitive market. Manufacturing plants use computer controlled manufacturing processes, which are dependent on a high degree of electrical distribution reliability. A power outage disrupts the manufacturing process, creating scrap material, lost productivity, damaged tooling and missed delivery schedules. It is very clear that in any economic analysis determining the level of capital spending required to sustain the distribution system, both LDC costs and customer costs should be considered.

Investing in system reliability improvements supports our purpose to provide safe, reliable, cost effective electricity to our customers. The "do nothing option" i.e. do not spend any money on system reliability initiatives, results in increasing customer outage times and frequency as well as substantially increasing manufacturing inefficiencies.

The shareholder has declared that EnWIN Powerlines Ltd. must operate as a safe, efficient and cost effective electricity distribution utility whose performance is "best in class". The objective of this report is to identify a go forward strategy ensuring EnWIN's Reliability indices compare favourably with London Hydro and Horizon Utilities (Hamilton Hydro). This report will identify the root causes of power interruptions, the impact these interruptions have on EnWin Powerlines Ltd. (EwP) customers and how this methodology can be employed to improve system reliability.

## Background

### Current State

In 2004, (See MEARIE report, Appendix B), EnWin Powerlines Ltd. was a **bottom Quartile performer by ranking 13<sup>th</sup> overall** for Large Utilities in Ontario (out of 16) for outage reliability statistics (See Table 1)\*.

	Enwin Powerlines (Rank 13)	Hamilton Hydro (Rank 9)	London Hydro (Rank 14)	2004 PROVINCIAL AVERAGE
<b>SAIDI</b> (hrs.)	1.21	0.77	1.32	0.919
<b>SAIFI</b>	2.73	1.03	2.09	1.337
<b>CAIDI</b> (hrs.)	0.44	0.74	0.63	0.735

*Table 1: 2004 Reliability Statistics "AT A GLANCE"*

\*NOTE: London Hydro did not participate in this study. The London Hydro statistics were obtained via telephone and their rankings were placed in manually for this report.

**SAIDI** – Defined as the **average interruption duration for customers served during the year**. EnWIN's 2004 SAIDI was 1.21 hours (1 hour and 13 minutes). This compares against the MEARIE 2004 Provincial large users SAIDI value of 0.919 (55 minutes)

**SAIFI** – Defined as the **average number of times that a customer is interrupted during the year**. EnWIN's 2004 SAIFI was 2.73 interruptions per customer. The 2004 Provincial average is 1.337 interruptions per customer.

**CAIDI** – Defined as the **average length of an interruption**. EnWIN's 2004 CAIDI was 0.44 hours (26 minutes). The 2004 Provincial average is 0.735 hours (44 minutes).

## Future State

EnWin Powerlines has established corporate goals for 2006 to set the stage to become "best in class". To become best in class, EwP must take steps to become a top quartile "Large Utility" system reliability performer in the Province of Ontario.

## Challenges/Issues

The challenge is to balance the costs of reliability with the level of service customer's demand, at a price the customer is willing to pay. In addition to customers demanding better service at lower cost, the regulator (the Ontario Energy Board – OEB) has entered the picture with rate decisions tied to service reliability. This point was exemplified during Hydro Ottawa's rate application hearings on January 23, 2006. The OEB voiced numerous concerns over Ottawa Hydro's proposed Capital Spending reductions and their impact on reliability and service quality levels (Refer to the OEB's website for rate application hearing transcripts [http://www.oeb.gov.on.ca/documents/cases/EB-2005-0381/vol01\\_230106.doc](http://www.oeb.gov.on.ca/documents/cases/EB-2005-0381/vol01_230106.doc)).

When economics associated with reliability is discussed, there are three different perspectives: the electric utility's viewpoint, the customer's viewpoint, and the regulator's viewpoint. Each have different concerns and interests, as such, each will yield a different set of conclusions regarding expenditures on system reliability.

### *Electric Utility's Viewpoint*

From EwP's viewpoint, the economics include expenditures to improve reliability in order to generate an increase in kWh sales (i.e. less than \$4,000 per year). In addition to the quantitative measures there are additional benefits such as improved customer service, decreased customer complaints (examples of customer complaints can be found in Appendix G), better public relations, and decreased pressure from the OEB. Another factor which has not been traditionally considered, is the justification for reliability expenditures to keep existing customers or attract new customers from choosing an alternate site to re-locate and/or build facilities and subsequently purchase power from a competitor. By comparison, the automobile manufacturers in North America have improved the reliability of their products in order to retain existing customers, maintain revenues, attract new customers, etc. EwP is now in a similar situation, forced by customers and the OEB to expend resources on reliability improvement in the face of new competition (competition being other communities where these manufacturers could move/build their facilities).

### *Customer's Viewpoint*

Customer's demand reliable power because outage costs from lost production, scrapped material, and additional cleanup and repairs can be significant. The commercial and industrial customers in the City of Windsor lose approximately \$7.8 Million dollars each year due to unplanned power outages. This calculation is based upon formulas found in the Institute of Electrical and Electronics Engineers (IEEE) Standard 493-1997 (See Appendix A)

These findings are anecdotally supported in the form of a letter (See Appendix G) from one of Windsor's larger manufacturing customers, Kautex Textron. In this letter, Kautex claims that power quality in 2002 cost their facility \$160,000. They also indicated they don't experience the same level of interruptions in other facilities in North America. If Kautex decided to close their doors in Windsor due to inferior power quality, the net **reduction in distribution revenue would be \$195,136.73/yr.**

Similar letters and conclusions can be found in this same appendix where there are a number of referenced complaint letters regarding power quality.

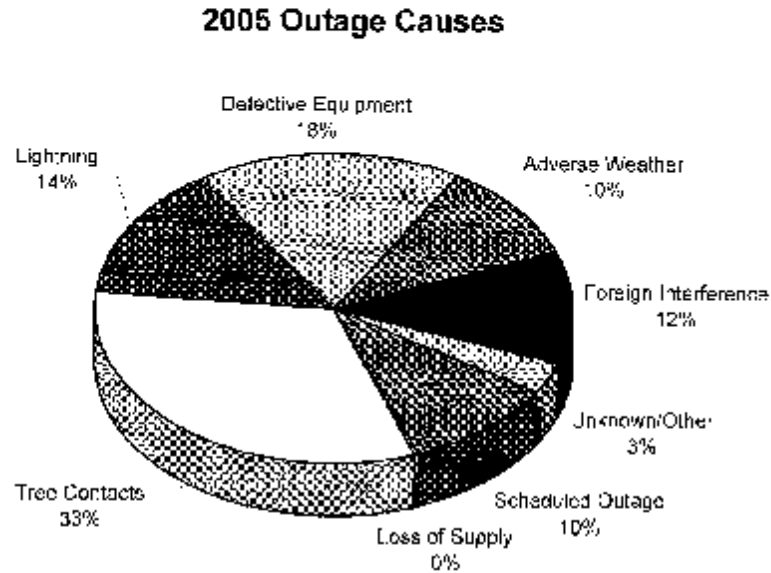
### *Regulator's View*

Performance Based Ratemaking (PBR) seeks to establish an environment that stimulates the utilities to improve efficiency and keep prices in line with inflation. This has the potential of forcing some utilities to sacrifice maintenance and other costs for the sake of providing a reasonable rate of return to their shareholders. As customers are held captive, the OEB is charged with the duty to ensure Utilities do not forfeit reliability for profits. They do this through benchmarking Service Quality Indicators such as those mentioned above (i.e. SAIDI, SAIFI and CAIDI) and any indices over the 3-year average must be explained to the OEB. With this data, rate plans can be compared against annual performance to baseline performance standards. In addition to this, there are talks surrounding penalties being included to discourage deterioration in service with budget cuts.

### *Root Cause Analysis*

EnWIN requires a 60% system reliability improvement to reach the top quartile performers. To move from the current state (13<sup>th</sup> in the Province) to the planned future state (top quartile performer) the root causes must be identified and addressed. An analysis of the outage statistics for the years 2001 through 2003 identified Lightning, Trees and Adverse Weather as the predominant factors related to unplanned power outages (See Appendix C).

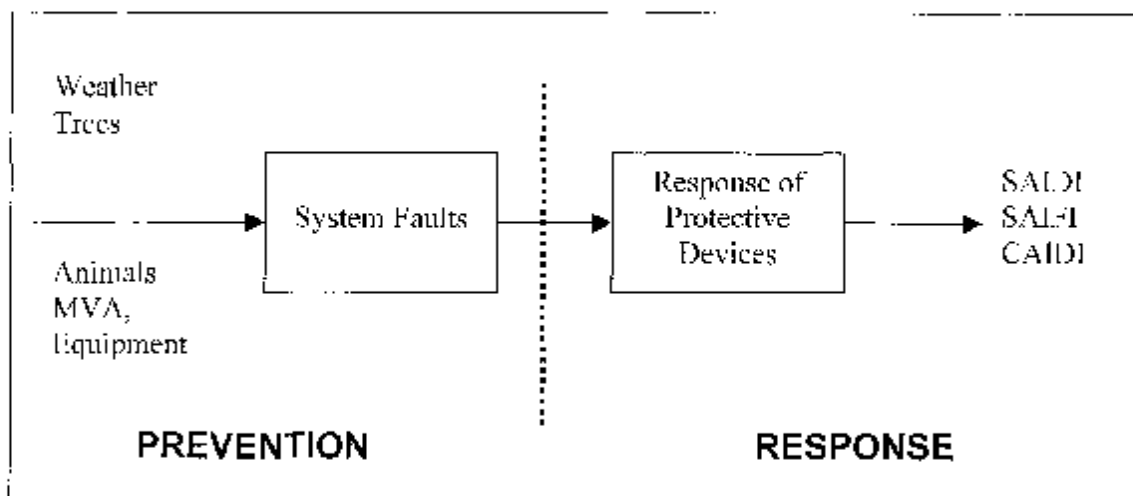
Review of the 2005 Outage statistics, shows the root causes below:



*Figure 1: 2005 Root Causes of Outages*

To improve System Operating Reliability we must:

- Limit the number of incidents and avoid major incidents (Prevention);
- Limit the consequences of major incidents when they do occur (Response)



*Figure 2: Prevention and Response Initiatives*

A number of programs focusing on PREVENTION are already in place and are summarized below:

- Defective Equipment related outages – Infra-Red Scanning, Insulator Washing, System Inspection (Poles, Wires, Grounding, Underground Vaults, etc), Station Maintenance Preventive Maintenance and the Rehabilitation (4.16kV Conversion) program are all initiatives EnWIN undertakes to minimize outages caused by defective plant and equipment.
- Weather & Rodent related outages - Tree Trimming, installation of "squirrel" guards, installation of "tree-proof" cable, installation of lightning arresters and fused taps are all programs aimed at preventing/reducing outages related to weather, trees and animals.

The Recloser Loop Scheme program focuses on RESPONSE, more particularly, how protective devices can be utilized to help improve system reliability.

### *Proposals*

A variety of system reliability improvement proposals along with their corresponding projected reliability improvements are listed below:

Project	SAIDI Improvement (%)	Projected Cost	Cost (\$Millions)/ % Improvement
Loop scheme implementation	10	\$1 M	0.1
More aggressive tree trimming	5	\$300k/yr for 20 years NPV = \$3.7 M	0.74 Not practical, politically sensitive
Tree cable installation on existing 27.6 kV circuits	10	\$4 M	0.4
Replace overhead line with underground cable	30	\$40 M	1.33

Of the proposals mentioned above, the loop scheme implementation offers the largest return on capital employed with respect to reliability improvements. More aggressive tree trimming may not be financially and politically attractive as many residents are very concerned over the aesthetics of aggressive tree trimming. Changing the clearance standard from 8 feet to 16 feet would entail the destruction of many trees within the City limits. Tree cable installations were piloted in 2005 with the rebuild of the Riverside area in the City of Windsor. The benefits related to this program will be presented next year based upon field data expected this year. Replacing overhead lines with underground cable comes at a premium of more than 5 times the current overhead reconstruction costs.



Based upon these factors, it is argued the loop scheme implementation on 27.6 kV feeders is the most economic method to improve system reliability quickly.

## **Loop Scheme Theory**

The theory behind the loop scheme methodology is to allow the system protective devices to operate without human intervention thus allowing the system to restore power to as many customers as possible in as short a time as possible. It is constructed using recloser devices in the middle (mid-point reclosers, denoted by A & B in Figure 3, below) and at the ends (tie-point reclosers, denoted by T) of the circuits. The mid-point reclosers were installed between 2002 and 2004. The loop scheme can provide isolation of faulted sections within a given distribution circuit and simultaneously, re-establish service to all customers unaffected by the faulted section within a relatively short period.

### **Components and characteristics**

**Substation circuit breaker** - A substation circuit breaker is a mechanical switching device, capable of making, carrying, and breaking currents under normal circuit conditions and also, making, carrying for a specified time and breaking currents under specified abnormal circuit conditions such as those of short circuits.

**Mid-Point recloser** - A mid-point recloser is a recloser electrically located between a breaker and a tie-point recloser. The mid-point reclosers are normally closed.

**Tie-Point recloser** - A tie-point recloser is a recloser located at the electrical halfway point between two sources or two distribution feeder circuits. Typically a tie-point recloser is electrically located between two mid-point reclosers. The tie-point reclosers are normally open.

The configuration is shown in Figure 3.

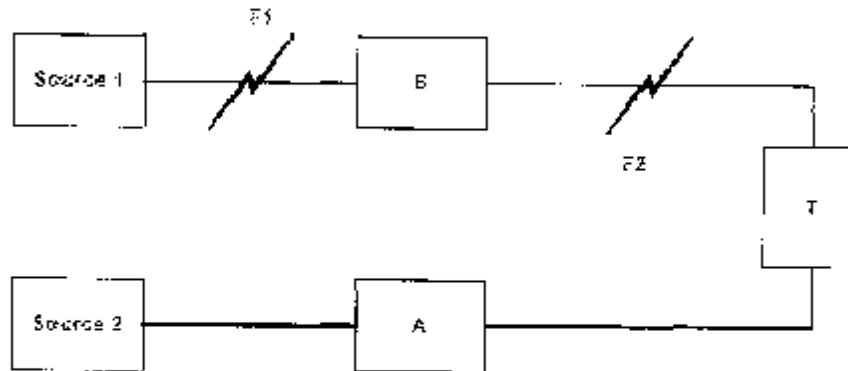


Figure 3: Classical 3-Recloser loop control scheme

#### Classical 3-Recloser Fault 1 Scenario

A permanent fault exists at location F1 (Figure 3), between the Source 1 circuit breaker and the mid-point recloser B. The Source 1 circuit breaker will recognize the downstream fault and go through its one reclosing shot to lockout. On lockout of the Source 1 circuit breaker at certain time ( $t_0$ , seconds) the mid-point recloser B will recognize a loss of 3-phase voltage at  $t_1$ , seconds, after the initial fault or (Eq. 1) and automatically open, isolating the faulted zone, F1, on the source side of the recloser.

$$t_1 = t_0 + 10s \quad (\text{Eq. 1})$$

The tie-point recloser T will at the same instant recognize a loss of 3-phase voltage on the Source 1 side of the recloser. After an additional delay time from the initial fault at Source 1 or (Eq. 2), the tie-point recloser T will close. This establishes service from Source 2, to recloser A, and through the tie-point recloser T to the open sectionalizing recloser B.

$$t_2 = t_1 + 10s \quad (\text{Eq. 2})$$

According to the published literature (See Appendix E), utilities employing this technology can significantly improve system reliability. In some test cases, improvements of up to 25% were anticipated. These improvements will vary based upon a variety of factors such as customer class make-up, length and configuration of circuits, etc.

## Benefits from Loop Scheme

The improvement can be achieved by reducing the outage time when a fault occurs at F1 in Figure 3. Traditionally, emergency responders are dispatched to isolate faulted sections of line. In many instances this may take up to a couple of hours. By implementing the loop scheme, the load on the healthy sections can be transferred in less than a minute. Outages lasting less than one minute in duration are not counted in the reliability indices.

Based upon the analysis of EnWIN's historical fault data (See Appendix D), system reliability can be improved by 10-15% using a loop scheme. Two scenarios were analyzed using *EnWIN's* 2005 reliability data (NOTE: It would have been too difficult to adjust the 2004 figures for this analysis, as such, 2005 outage data was used). These were, Present System (which includes 32 mid-point pole top reclosers and the Loop Scheme. The following table summarizes the findings of this analysis:

Reliability Index (2005)	Present System	Loop Scheme (% Change)
SAIDI	2.65	2.28 (14.09% Improvement)
SAIFI	3.16	2.70 (14.57% Improvement)
CAIDI	0.84	0.84 (No Change)

In summary, this table shows that had the tie-point reclosers been installed in the system, the reliability would have improved by 14%.

Assuming tie point reclosers had been installed in 2003 and the 10% improvement to reliability indices (a conservative estimate) had been realized for 2004, EnWIN would have improved their provincial ranking to the 11<sup>th</sup> position. This is squarely in the third quartile, just two places behind Horizon Utilities (former Hamilton Hydro).

Furthermore, this improvement in response time translates to customer cost savings in the order of \$1.1 Million per year (see Appendix A). This is the minimum amount that customers should be willing to pay in rates for improved reliability. Other intangible factors such as inconvenience will result in a higher investment level.

Another concern impacting system reliability is related to cost saving measures being introduced this year with the planned reductions in shift coverage by the trouble department. As exposure related to un-manned shifts increase so do potential liabilities and response times related to power interruptions. The loop scheme proposal will help alleviate some of these pressures.

## Other Benefits

The loop scheme, if implemented, will enable quick transfer of load between feeders. A loop scheme recloser has the potential to be used not only for reliability improvements but also for fast load shedding and restoration during emergencies. This provides an added benefit by ensuring EnWIN's most critical customers (i.e. large manufacturers and Hospitals) are protected from extended loss of supply.

Another benefit relates to the provision of better customer service regarding supply voltage inquiries/complaints. Since these tie reclosers will be installed at the ends of the feeders, EnWIN staff can better obtain power quality information, which will enhance the ability of the System Operators and Planning Engineer to address customer supply complaints such as low voltage problems due to long feeder lengths and load increases. The availability of real time information from the reclosers will allow the company to proactively deal with low voltage problems.

An added benefit of the improved power quality is the retention of key customers such as Ford, General Motors, Daimler, Kautex, Windsor Mold, etc. plus the added potential of drawing in or attracting new facilities and/or plant expansions. Again, supporting information relating to these factors can be found in Appendices F & G.

## Conclusion and Recommendation

If the improvement to distribution system reliability can't be economically justified through an increase in kilowatt-hour sales, why is it so important to continue to spend in this area? One reason is, pressure from our regulator, the Ontario Energy Board and their threats to establish minimum performance levels measured by SAIDI, SAIFI and CAIDI. Based upon the 2004 MEARIE report, EnWin Powerlines Ltd. ranks 13<sup>th</sup> out of the 16 large Utilities in the Province of Ontario when it comes to system reliability. OEB pressure to improve may come in the form of penalties for failing to meet established benchmarks accompanied by refusal to allow EnWIN to increase their rates to cover ever-increasing costs.

Another driver is the avoidance of negative public relations. A utility with a reputation for unreliable service cannot attract major industrial customers to its service territory much less maintain its existing customer base.

General customer satisfaction is another factor to consider. A cornerstone of EnWin Powerlines' Ltd. mission statement is to provide reliable electrical service to its customers. EnWin Powerlines Ltd. corporate objectives also include the desire to foster a culture of continuous improvement with an eye toward being "best in class" where possible. This initiative is in keeping with that goal.

The recommendation of this report is to fund the project with the lowest cost providing the maximum improvement to reliability, namely, the loop scheme (distribution automation) plan. This program will cost \$1 Million to be spent over 2 years (i.e. \$500,000 has already been budgeted for 2006 and another \$500,000 will be required in 2007).

By implementing the loop scheme, ENWIN is expecting to:

- Improve system reliability by an additional 10% (see Appendix D-note assumptions and Appendix E). All factors being equal, a 10% improvement in reliability would place EnWIN two places behind Hamilton in 11<sup>th</sup> place out of 16.
- Reduce impacted customer cost by \$1.1 Million dollars per year (see last page of Appendix A).
- Operate the reclosers remotely thus improving response time.
- Transmit voltage, current, power factor and power quality information through the SCADA system to help system operation and planning.
- Provide quick load shedding and restoration ability during emergencies

**Appendix A**  
**Interruption Costs, Customer Satisfaction and Expectations for**  
**Service Reliability**

**IEEE Std 493-1997**  
(Revision of IEEE Std 493-1990)

# **IEEE Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems**

**Sponsor**

**Power Systems Reliability Subcommittee  
of the  
Power Systems Engineering Committee  
of the  
IEEE Industry Applications Society**

**Approved 16 December 1997**

**IEEE Standards Board**

**Abstract:** The fundamentals of reliability analysis as it applies to the planning and design of industrial and commercial electric power distribution systems are presented. Included are basic concepts of reliability analysis by probability methods, fundamentals of power system reliability evaluation, economic evaluation of reliability, cost of power outage data, equipment reliability data, examples of reliability analysis. Emergency and standby power, electrical preventive maintenance, and evaluating and improving reliability of the existing plant are also addressed. The presentation is self-contained and should enable trade-off studies during the design of industrial and commercial power systems design, installation, and maintenance practices for electrical power and grounding (including both power-related and signal-related noise control) of sensitive electronic processing equipment used in commercial and industrial applications are presented.

**Keywords:** Designing reliable industrial and commercial power systems, equipment reliability data, industrial and commercial power systems reliability analysis, reliability analysis.

## Introduction

(This introduction is not a part of IEEE Std 493-1997, IEEE Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems.)

The design of reliable industrial and commercial power systems is of considerable interest to many people. Prior to 1962, a qualitative viewpoint was taken when attempting to achieve this objective. The need for a quantitative approach was first recognized in the early 1960s when a small group of pioneers led by W. H. Dickinson organized an extensive AIEE survey of the reliability of electrical equipment in industrial plants. The AIEE survey that was taken in 1962 was followed by several IEEE reliability surveys, which were published in 1973 through 1979. These surveys from the the 1970s were the basis for the reliability data contained in IEEE Std 493-1980. Six additional IEEE reliability surveys have been conducted and published during the 1980s and have been updated in this revision of IEEE Std 493-1997. The 1990 edition included pertinent tutorial reliability material and the cost of power interruptions data.

IEEE Std 493-1997 presents two new chapters, Chapter 9, a new methodology for estimating the frequency of voltage sags at industrial and commercial sites, and Chapter 10, a methodology for estimating the number of tests required to demonstrate reliability of emergency and standby systems. New appendices have been added on high- and low-voltage circuit breakers, reliability data, guarantees of gas turbines and combined cycle generating units, transmission line and equipment outage data, interruption costs, and expectations for service reliability. The existing appendices have been updated.

Tutorial reliability sessions on the design of industrial and commercial power systems were conducted at technical conferences of the IEEE Industry Applications Society in 1971, 1976, 1980, and 1991.

This recommended practice was prepared by a working group of the Power Systems Reliability Subcommittee, Power Systems Engineering Committee, Industrial and Commercial Power Systems Department of the IEEE Industry Application Society.

This IEEE Recommended Practice serves as a companion publication to the following other Recommended Practices prepared by the IEEE Industrial and Commercial Power Systems Department:

- IEEE Std 141-1993, IEEE Recommended Practice for Electric Power Distribution for Industrial Plants (IEEE Red Book).
- IEEE Std 142-1991, IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems (IEEE Green Book).
- IEEE Std 241-1990, IEEE Recommended Practice for Electric Power Systems in Commercial Buildings (IEEE Grey Book).
- IEEE Std 242-1986, IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (IEEE Blue Book).
- IEEE Std 399-1990, IEEE Recommended Practice for Industrial and Commercial Power Systems Analysis (IEEE Brown Book).



IEEE Std 446-1995, IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications (IEEE Orange Book).

- IEEE Std 602-1996, IEEE Recommended Practice for Electric Systems in Health Care Facilities (IEEE White Book).

IEEE Std 739-1995, IEEE Recommended Practice for Energy Management in Commercial and Industrial Facilities (IEEE Bronze Book).

- IEEE Std 1015-1997, IEEE Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems (IEEE Blue Book).
- IEEE Std 1100-1992, IEEE Recommended Practice for Powering and Grounding Sensitive Electronic Equipment (IEEE Emerald Book).

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# COST OF ELECTRICAL INTERRUPTIONS IN COMMERCIAL BUILDINGS

by

Power Systems Reliability Subcommittee Report  
Philip E. Garmon, Coordinating Author<sup>1/</sup>

## Abstract

An IEEE sponsored reliability survey to determine the cost of electrical interruptions in commercial buildings was completed in 1974. The survey form was a simplified version of forms used in 1972 reliability study of industrial plants. The survey included building types and locations, and length and cost of electrical service interruptions. The survey results reflect data from 48 companies covering 55 buildings in the United States. This information is useful in the design of electrical systems for commercial buildings.

## Introduction

Knowledge of the cost of power outages, both for normal and critical services, is useful in the design of commercial building power systems. Allowing cost-effective judgments to be made with respect to the installation of a second utility company service, an emergency generator, or provision of uninterruptible power supply.

During 1974 the Reliability Subcommittee of the Industrial and Commercial Power Systems Committee completed a survey of the cost of electrical interruptions in commercial buildings in the United States. Included in this paper are the following results:

- 1 Cost of power outages to commercial buildings (\$ per kWh of undelivered energy).
- 2 Cost of power outages to commercial buildings (\$ per square foot/hr and \$ per employee/hr).
- 3 Critical service loss duration time (length of time before an interruption causes a significant loss).
- 4 Miscellaneous items relative to provision of auxiliary generators, types of electrical services, and other physical data.

## Survey Form

The survey form is shown in Appendix A (two pages). A simple multiple choice or single line fill-in form was utilized (in an attempt to reduce the time of the respondents, but still provide pertinent data for a meaningful analysis).

## Response to Survey

A total of 48 companies reporting on 55 buildings responded to the survey with complete data. Incomplete data, omitting the critical outage cost information was received on 12 additional buildings. Unfortunately, this data was of no value in the present survey. Valid data was submitted almost equally for buildings located in the eastern, central, and western regions of the U.S.A.; with 43 percent of the buildings in downtown areas, 17 percent in urban areas, and 40 percent in suburban areas. Forty-six percent of the buildings were used 3 days per week; 39 percent, 6 days per week; and 15 percent, 7 days per week.

## Survey Data Preparation

All of the returned survey forms were reviewed. Usable data was punched onto computer cards for use in data processing.

## Survey Results -- Cost of Power Outages

Each respondent was asked to report on the cost of power outages as follows:

- 1 Dollars per failure -- 15-minute duration, one-hour duration, and greater than one-hour duration; total value of lost operation including wages, damages for delays, loss of computer time, and loss of retail sales minus cost of goods not sold was to be included.
- 2 Critical service loss duration time -- length of time before an interruption causes a significant loss.
- 3 Building maximum power demand, and usage, as well as area and number of employees.

The only way it was possible to calculate the cost of power outages in terms of dollars per kilowatt-hours of undelivered energy at building peak load.

The average cost of power outages from the survey for the buildings surveyed is given in Table 1.

TABLE 1  
AVERAGE COST OF POWER OUTAGES  
FOR BUILDINGS IN THE UNITED STATES

All commercial buildings	\$7.11/KWH not delivered
Office buildings only	\$8.86/KWH not delivered

The average maximum demand was 3,095 kW for all commercial buildings reporting outage costs. The maximum demand for the office buildings was only 3,033 kW.

Additional details of the cost of power outages are given in Tables 2, 3, and 4. The tables present additional data (including):

- 1 Outage costs for "office buildings" as a function of duration of outage for three time periods.
- 2 Effect of computers on outage costs.
- 3 Relationship of outage costs to: KWH not delivered, to cost per 1,000 square feet per hour of building affected, and to cost per employee per hour affected.

<sup>1/</sup> Other members of Sub-Committee: A.B. Patton Chairman; C.K. Meising, Vice Chairman; C.E. Becker; H.F. Charnov; W.H. Dickinson; M.D. Harris; E.J. Kulvicki; D.W. McWilliams; R.W. Parisian; Stanley Wells

TABLE 2

OUTAGE COSTS FOR "OFFICE BUILDINGS"  
AS A FUNCTION OF DURATION  
(WITH AND WITHOUT COMPUTERS)

	Sample Size	Maximum	Minimum	Average
<u>15-Minute Duration</u>				
Cost/peak KW hr. not delivered	25	\$ 22.22	\$ 1.50	\$ 7.54
Cost/1,000 sq. ft. of bldg./hr.	26	247.4	10.5	63.8
Cost/employee/hr.	26	52.0	3.0	16.0
<u>1-Hour Duration</u>				
Cost/peak KW hr. not delivered	29	\$ 24.93	\$ 0.64	\$ 6.74
Cost/1,000 sq. ft. of bldg./hr.	32	125.00	5.24	53.12
Cost/employee/hr.	32	34.30	1.35	12.22
<u>Duration: 1 Hour</u>				
Cost/peak KW hr. not delivered	15	\$100.00	\$ 0.16	\$ 16.16
Cost/1,000 sq. ft. of bldg./hr.	14	320.00	1.03	64.00
Cost/employee/hr.	14	75.00	0.48	16.42

TABLE 3

OUTAGE COSTS FOR "OFFICE BUILDINGS"  
AS A FUNCTION OF DURATION  
(WITHOUT COMPUTERS)

	Sample Size	Maximum	Minimum	Average
<u>15-Minute Duration</u>				
Cost/peak KW hr. not delivered	11	\$ 10.70	\$ 1.50	\$ 5.74
Cost/1,000 sq. ft. of bldg./hr.	11	107.4	10.54	49.54
Cost/employee/hr.	11	28.56	3.00	12.56
<u>1-Hour Duration</u>				
Cost/peak KW hr. not delivered	13	\$ 13.13	\$ 0.91	\$ 3.30
Cost/1,000 sq. ft. of bldg./hr.	15	120.0	5.24	48.42
Cost/employee/hr.	15	26.57	1.25	10.64
<u>Duration: 1 Hour</u>				
Cost/peak KW hr. not delivered	1	\$100.00	\$ 0.97	\$ 56.66
Cost/1,000 sq. ft. of bldg./hr.	1	320.00	46.00	154.00
Cost/employee/hr.	1	50.00	4.00	27.52

TABLE 4

OUTAGE COSTS FOR "OFFICE BUILDINGS"  
AS A FUNCTION OF DURATION  
(WITH COMPUTERS)

	Sample Size	Maximum	Minimum	Average
<u>15-Minute Duration</u>				
Cost/peak KW hr. not delivered	14	\$ 22.22	\$ 1.88	\$ 8.89
Cost/1,000 sq. ft. of bldg./hr.	15	150.00	16.57	78.11
Cost/employee/hr.	15	52.00	4.00	18.33
<u>1-Hour Duration</u>				
Cost/peak KW hr. not delivered	16	\$ 24.93	\$ 1.88	\$ 8.30
Cost/1,000 sq. ft. of bldg./hr.	17	125.00	15.96	54.92
Cost/employee/hr.	17	34.30	4.00	13.62
<u>Duration: 1 Hour</u>				
Cost/peak KW hr. not delivered	10	\$ 67.66	\$ 0.16	\$ 9.81
Cost/1,000 sq. ft. of bldg./hr.	11	224.15	1.05	44.02
Cost/employee/hr.	11	73.81	0.48	14.70

**TABLE 5**  
**CRITICAL SERVICE LOSS DURATION TIME**  
**FOR "ALL BUILDINGS"**

	Service Loss Duration Time								
	1 Cycle	2 Cycles	4 Cycles	8 Sec.	1 Sec.	5 Min.	30 Min.	1 Hour	12 Hours
Percent of buildings with critical service loss duration less than or equal to the time indicated.	21	52	92	100	100	100	100	100	100

**TABLE 6**  
**CRITICAL SERVICE LOSS DURATION TIME**  
**FOR "OFFICE BUILDINGS"**

	SERVICE LOSS DURATION TIME							
	1	2	4	8	16	30	60	120
	MINUTE	MINUTE	MINUTE	MINUTE	MINUTE	MINUTE	MINUTE	MINUTE
PERCENT OF BUILDINGS WITH CRITICAL SERVICE LOSSES LESS THAN OR EQUAL TO THE TIME INDICATED.	54	100	100	100	100	100	100	100

**TABLE 7**  
**RELATIONSHIP OF AUXILIARY GENERATORS**  
**AND SINGLE FEEDER SERVICE TO "ALL BUILDINGS"**

	Number of Responses	Buildings with Auxiliary Generation	No Auxiliary Generation and Only Single Feeder
Buildings with computers	21	15	1
Buildings without computers	32	13	7
TOTAL	53	28	8

**Survey Results -- Critical Service Loss Duration Time**

The amount of time an electrical service can be interrupted before it causes significant losses is a question which our profession has not been able to suit-

ably define. The results of the survey indicate that individual requirements for electrical energy are such that it is probably not possible to establish a general critical service loss duration time. The survey results are shown in Tables 5 and 6.



TABLE 8  
TYPE OF ELECTRICAL SERVICE  
TO "ALL BUILDINGS"

	Number of Responses	Type of Service			
		Single Feeder	Network	Multiple Feeder	Other
Buildings with computers	23	1	8	12	2
Buildings without computers	32	12	20	7	3
TOTAL	55	13	28	19	5

TABLE 9  
PHYSICAL DATA — "ALL BUILDINGS"

Item	Sample Size	Maximum	Minimum	Average
Area, sq. ft. $\times 10^3$	54	2,085	3	400
Number of floors	55	52	1	13
Number of employees	51	7,000	12	1,384
Annual usage — Megawatt hours	52	101,349	210	11,971
Peak kilowatt demand	52	17,250	95	3,095

TABLE 10  
PHYSICAL DATA — "OFFICE BUILDINGS"

Item	Sample Size	Maximum	Minimum	Average
Area, sq. ft. $\times 10^3$	35	1,000	38	371
Number of floors	25	44	2	13
Number of employees	35	7,000	150	1,551
Annual usage — Megawatt hours	32	51,046	840	7,444
Peak kilowatt demand	32	17,000	270	3,035

TABLE 11  
AVERAGE OF PHYSICAL DATA  
FOR "ALL BUILDINGS"  
AND FOR "OFFICE BUILDINGS"

Item	ALL Buildings	Office Buildings
Kilowatt hours/L,000 sq. ft. of building area/year	29.3	33.5
Megawatt hours/employee/year	21.2	7.5
Peak kilowatt demand/L,000 sq. ft. of building area	22.5	22.5
Peak kilowatt demand/employee	5.0	2.5
Employees/L,000 sq. ft. of building area	3.4	4.7

Thirty-six percent of "all buildings" reporting could be without electrical energy for 5 minutes before the lack of energy was considered to be critical, while 6 percent could be without energy for only 2 cycles and 3 percent for only one cycle before significant losses were incurred.

Fifty percent of the "office buildings" reporting could be without electrical energy for 5 minutes before the lack of energy was considered to be critical, while 10 percent could be without energy for only 2 cycles, and 3 percent for only one cycle before significant losses were incurred.

Precautionary measures taken to minimize critical outages in buildings where computers are installed are indicated in Table 7, where 65 percent (15 of 23) of the buildings reporting have auxiliary generating units. Only 4 percent (1 of 23) of the buildings reporting have no auxiliary generation and are served by a single feeder from the utility company. A like com-

parison is shown for buildings not having computers; in these instances, 41 percent of the buildings have auxiliary generation and 22 percent are served by single feeders from the utility company.

Table 8 shows the type of electrical service to all buildings reporting. Eighty-seven percent of the buildings with computers have network or multiple feeder service, while 53 percent of the buildings without computers have network or multiple feeder service.

#### Survey Results — Demand and Usage Data

Each respondent was asked to report gross floor area, number of floors, number of employees, and electrical energy usage and demand. While not directly related to the subject of this paper, the data is of interest, and will perhaps allow the reader to make a better judgment of the validity of the data presented previously. The details are given in Tables 9, 10, and 11.

It is believed that the employee data for the "all buildings" category may not be valid, since it appears that not all employees were reported for some multi-function buildings, the office/retail category in particular.

#### Conclusions and Discussion of Results

##### 1 Cost of Power Outages (Tables 1, 2, 3, and 4)

- a There is a wide spread in the cost of power outages (KWH not delivered) in commercial buildings. Even within like types of buildings, with or without computers, there is a great difference in the costs assigned.

- b The cost per KWH not delivered increases greatly when the outage duration time increases one hour. An exception to this is buildings with computers.

It is probable that for outages of less than one hour, employees may remain partially productive and the temperature of their environment remain tolerable. For longer outages, employees may have to be toloughed for the remainder of the day.

- c The cost of power interruptions for buildings with computers varies from \$1.89/KWH average for outages of 15-minute duration to \$9.21/KWH for outages of greater than one hour. It is suspected that the small differential is due to the fact that a short duration as well as a long outage reduces the computer security and the employee air without nonproductive during this period or repairing possible damage caused by the outage.

- d A comparison of the average costs of outages for commercial buildings with that for industrial plants (Reference 1) is shown in Table 12. The data is interpreted to mean that short-term outages in industrial plants could be more costly than those in commercial buildings, while long-term outages are more costly in commercial buildings.

- e Additional information on the cost of power outages in Sweden, Norway, and the United States is contained in Reference 3.

##### 2 Critical Service Loss Duration Time (Tables 5 and 6)

- a As would be expected, there is a wide spread in the critical time of a power interruption. This is probably due to the wide variations of type of work being accomplished, the type of equipment involved, and the general work environment. For example, a windowless building in which a sensitive computer operation is performed would be more rapidly affected than a window-wall building performing normal office functions.

- b It is suggested that a future survey attempt to define the reasons for the wide variations.

##### 3 Demand and Usage Data (Tables 8, 10, and 11)

- c Of the "all building" data reported, the area averaged 400,000 square feet, 12 floors in height, with an annual usage of about 12,000 megawatt hours, and a demand of 3,000 KW. Minimum and maximum data were not available.

TABLE 12

COMPARISON OF AVERAGE COSTS OF POWER OUTAGES  
IN COMMERCIAL BUILDINGS AND INDUSTRIAL PLANTS

Type	Cost
All commercial buildings	\$7.21/KWH not delivered
Office buildings	\$1.86/KWH not delivered
Industrial plants — all	\$1.89/KW interrupted + \$2.68/KWH not delivered

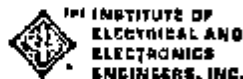
The data for "office buildings" indicates average values within 10 percent of that for "all buildings," except for the number of employees, which is 16 percent greater.

- b The average electrical usage for all buildings and for office buildings only is nearly equal when placed on a per unit basis (33.5 KWH/Sq. Ft.) as is the peak demand (11.3 Watts/Sq. Ft. to 11.5 Watts/Sq. Ft.). The relationship of usage and demand to employees does not correlate for all buildings and office buildings only. As mentioned heretofore, the validity of employee data with regard to the office/retail category of buildings is questionable. On this basis, no attempt to draw conclusions has been made.

#### References

- 1 A.D. Fessenden, et al., "Report of Reliability Survey of Industrial Plants, Part 4 - Additional Detailed Tabulation of Some Data Previously Reported in the First Three Parts," IEEE 1 & CPE Conference Record, June 2-6, 1974.
- 2 V.H. Dickinson, et al., "Report of Reliability Survey of Industrial Plants, Part 2 - Cost of Power Outages, Plant Restart Time, Critical Service Loss Duration Time, and Type of Loads Lost vs. Time of Power Outages," IEEE 1 & CPE Conference Record, May 14-16, 1973.
- 3 R.H. Shipley, A.G. Patton, J.E. Davison, "Power Reliability Cost vs. Worth," IEEE Transactions on Power Apparatus and Systems, PAS-91, P. 2204-2212, September/October 1972.

SURVEY FORM ON COST OF ELECTRICAL INTERRUPTIONS IN COMMERCIAL BUILDINGS



INDUSTRY AND GENERAL APPLICATIONS GROUP  
RELIABILITY SUBCOMMITTEE OF THE INDUSTRIAL  
& COMMERCIAL POWER SYSTEMS COMMITTEE

Electricity is an integral part of our every day life. If it isn't available -- what is its economic effect? Please help us to find out by filling out this form.

Please address reply to:

A. D. Patton  
Texas A & M University  
Electric Power Institute  
College Station, TX 77843

Date \_\_\_\_\_

1. COMPANY NAME (Fill in 5-letter abbreviation of name) \_\_\_\_\_
2. BUILDING NO. (Fill in sequence number 1, 2, 3, etc. for building(s) reported on) \_\_\_\_\_
3. BUILDING TYPE (Check type which best describes your building):  
☐ Office      ☐ Office/Retail Sales      ☐ Office/Retail Sales/Apartment  
☐ Retail Sales      ☐ Other (describe) \_\_\_\_\_
4. BUILDING LOCATION (Check applicable items):  
☐ Downtown;      ☐ Urban;      ☐ Suburban;  
☐ USA: Eastern;      ☐ USA: Central;      ☐ USA: Western
5. BUILDING DATA - GENERAL  
Gross Area, square feet \_\_\_\_\_  
Number of Floors \_\_\_\_\_  
Average Usage of Building: Hours/Day \_\_\_\_\_ Days/Week \_\_\_\_\_  
Estimated Number of Office Employees (if any) \_\_\_\_\_  
Estimated Annual Retail Sales (if any) \_\_\_\_\_  
Is Auxiliary or Emergency Generation Provided:      ☐ Yes      ☐ No

## SURVEY FORM - COMMERCIAL BUILDINGS IN USA

Page 2 of 2

**6. BUILDING ELECTRICAL USAGE DATA**

Electrical Energy Usage for 12-month Period \_\_\_\_\_ KWH

Electrical Maximum Demand for this Period \_\_\_\_\_ KW

Type of Service: ☐ Single Feeder; ☐ Network; ☐ Multiple Feeders With Automatic Transfer☐ Other (Explain) \_\_\_\_\_**7. COST OF A TOTAL INTERRUPTION OF ELECTRICAL SERVICE TO YOUR BUILDING DURING PEAK PERIOD** (Best opinion - if no interruptions have occurred, assume hypothetical instances)

a) 15-minute Duration \$ \_\_\_\_\_

b) 1-hour Duration \$ \_\_\_\_\_

c) \_\_\_\_\_ Hours Duration \$ \_\_\_\_\_

Does a, b, or c include losses from an "on-line" electronic computer? ☐ Yes ☐ No

For "Office Buildings" loss should include wages of all employees affected, plus any other direct costs incurred including delays, and damage to equipment. This would include any losses from an "on-line" electronic computer.

For "Retail Sales" cost should include estimated loss of sales minus cost of goods not sold, plus cost of any damage incurred.

**8. LENGTH OF INTERRUPTION OF ELECTRICAL SERVICE**If there a definitive length of time before an interruption causes a significant loss? ☐ Yes ☐ No

If "Yes", what is maximum time before significant losses will be incurred? \_\_\_\_\_ Hours \_\_\_\_\_ Minutes

Table 2. Customer Outage Cost Summary

Market Segment	Generation Outage Mean Outage Cost	Transmission or Distribution Outage Mean Outage Cost
Residential Customers		
Cost Per Event	\$4.91	\$1.19
Cost Per Peak kWh	\$1.68	\$2.35
Commercial Customers		
Cost Per Event	\$404.35	\$1,317.71
Cost Per Peak kWh	\$21.92	\$45.47
Industrial Customers		
Cost Per Event	\$4,433.00	\$9,403.52
Cost Per Peak kWh	\$3.00	\$1.61
System Wide		
Cost Per Event	77%	77%
Cost Per Peak kWh	\$2.19	\$16.15

Notes: 1. Values from Sample Compendium of Final Report for Year of Data in Study. December 1992.

market segment means (i.e., the mean for commercial or industrial customers). For example, multiple R's for regression models predicting outage costs arising from different kinds of outages ranged from .67 to .34. That is, these models explain between 34 and 67 percent of the variation in outage costs about the averages for the market segments—a statistically significant improvement over the predictive power arising from market segment alone.

Since much less information is required to estimate customer outage costs from the parameters in the regression model, it is possible to calculate customer specific outage cost estimates for all large customers (from regression models) and thus to obtain detailed estimates of customer outage costs without the expense of on-site surveys of all customers. This approach is being used by Duke Power Company to calculate circuit specific outage costs including unique estimates for each of its 1,000 largest customers.

Although less of the variation in residential interruption cost is accounted for by variation in other household attributes, significant statistical associations are found between residential customer interruption costs, the size of the

household and the age of its inhabitants. In general, the older the members of a household, the lower the household's average interruption cost. When children are present, customer interruption costs are significantly higher.

Circuit level interruption costs should be used when applying interruption cost information to transmission and distribution planning problems. While system average interruption cost estimates are meaningful and useful for generation planning, significant errors can be made by applying system average figures to particular circuits. Because of the variation that exists across circuits in the distribution of customers by market segment and size, customer interruption costs for particular circuits may deviate dramatically from system averages.

From the individual customer's point of view, generation outages (i.e., those including advance warning) are inherently less costly than transmission and distribution outages (i.e., those without warning). Advance warning significantly lowers the costs of outages for commercial and industrial customers. Table 3. illustrates the effect of advance notice on customer outage costs.

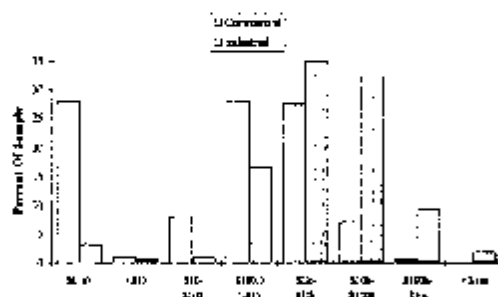


Fig. 24. Commercial and Industrial Customers

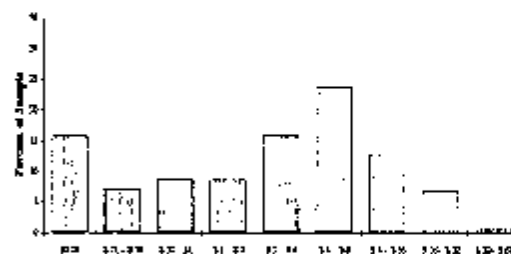


Fig. 25. Residential Customers

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Calculations showing Customer's lost cost based upon IEEE report:

<b>ENWIN Revenue Loss</b>	
Cust-hour	34,789
Cust interr	
hour/Cust	0.41
Total cust	85,446
Average Demand	508.1
Loss, MWh	206.9
Loss cost	\$ 3,384.99
Crew	60
Cost of crew	\$ 18,000.00
Total cost	21,384.99
Project cost	\$ 500,000.00

<b>Present- Customer Outage Loss-Cost per year</b>					
<i>Residential</i>		<i>Commercial</i>		<i>Industrial</i>	<i>Total</i>
	kW on total residential cust, demand		kW on total commercial cust, demand		kW on total industrial cust, demand
201,696		120,915.90		185,438.25	508,050
\$ 2.07	/kWh	\$ 7.21	/kWh	\$ 7.61	/kWh
\$ 1,206,566.29	lost per year	\$2,519,431.51	lost per year	\$ 4,078,193.76	lost per year
					\$ 7,804,191.56

TotalCust-hour	246,931
Total cust	85,446
hour/Cust	2.89

<b>Projected - Customer Outage Loss- Saving Per Year</b>					
<i>Residential</i>		<i>Commercial</i>		<i>Industrial</i>	<i>Total</i>
	kW on total residential cust, demand		kW on total commercial cust, demand		kW on total industrial cust, demand
201,696		120,915.90		185,438.25	508,050
\$ 2.07	/kWh	\$ 7.21	/kWh	\$ 7.61	/kWh
\$ 169,987.71	lost per year	\$ 364,951.39	lost per year	\$ 574,558.41	lost per year
					\$ 1,099,497.51

TotalCust-hour	34,789
Total cust	85,446
hour/Cust	0.41

**Appendix B**  
**2003, 2004 and 2005 Utility Performance Management Survey -**  
**By MEARIE Group**



**R20**

System Average Interruption Duration Index (SAIDI)

<b>Large Utilities</b>			<b>Rank</b>
Thunder Bay	1.96	1. 3 2 } Q <sub>4</sub>	17
Waterloo North	1.85		16
Barrie	1.35		15
→ Enwin	1.21		14
Burlington	1.16	} Q <sub>3</sub>	13
Toronto	1.10		12
St. Catharines	0.96		11
Hamilton	0.77	} Q <sub>2</sub>	10
Hydro Ottawa	0.75		9
Hydro One Brampton	0.73		8
PowerStream	0.59		7
Oakville	0.56	} Q <sub>1</sub>	6
Kitchener-Wilmot	0.51		5
Guelph	0.43		4
Greater Sudbury	0.38		3
Enersource	0.37		2
Count	16		1
Average	0.919		
Range (min, max)	0.37 to 1.96		

<b>Medium Utilities</b>		
Peninsula West	4.60	
PUC Distribution	3.61	
Haldimand County	3.07	
Newmarket	2.04	
Peterborough	1.95	
Norfolk	1.90	
Festival	1.89	
Grimsby	1.83	
Brant County	1.62	
Chatham Kent	1.61	
Collis Power	1.38	
Haltim Hills	1.14	
Welland	0.74	
Orangeville	0.58	
Whitby	0.46	
Oshawa	0.41	
Woodstock	0.34	
St. Thomas	0.15	
Count	18	
Average	1.629	
Range (min, max)	0.15 to 4.60	



R22

## System Average Interruption Frequency Index (SAIFI)

## Large Utilities

			Rank	
→	Edwin	2.73	17	Q4
	Thunder Bay	2.71	16	
	Waterloo North	2.20	15	
	St. Catharines	1.70	14	
	Toronto	1.60	13	Q3
	Chelph	1.55	12	
	Barrie	1.33	11	
	Hydro One Brampton	1.27	10	Q2
	Hamilton	1.03	9	
	Oakville	1.03	8	
	PowerStream	0.99	7	
	Burlington	0.93	6	Q1
	Hydro Ottawa	0.66	5	
	Egersource	0.62	4	
	Greater Sudbury	0.53	3	
	Kitchener-Wilmot	0.51	2	
	Count	16	1	
	Average	1.337		
	Range (min, max)	0.51 to 2.73		

## Medium Utilities

Norfolk	3.69
Peninsula West	3.55
PUC Distribution	3.27
Welland	2.98
Peterborough	2.42
Haldimand County	1.84
Festival	1.80
Orillia	1.39
Chatham Kent	1.30
Newmarket	1.28
Haiton Hills	1.00
Whitby	0.86
Orangeville	0.64
Grimsby	0.47
Woodstock	0.46
Colus Power	0.35
St. Thomas	0.32
Brant County	0.03
Count	18
Average	1.536
Range (min, max)	0.03 to 3.69

**R21**

Customer Average Interruption Duration Index (CAIDI)

**Large Utilities**

Burlington	1.25	17	Q4
Hydro Ottawa	1.15	16	
Kitchener-Willmot	1.06	15	
Barrie	1.01	14	
Waterloo North	0.84	13	Q3
Hamilton	0.74	12	
Thunder Bay	0.72	11	
Greater Sudbury	0.72	10	Q2
→ Toronto	0.69	9	
PowerStream	0.59	8	
Enersource	0.59	7	
Hydro One Brampton	0.57	6	Q1
St. Catharines	0.56	5	
Oakville	0.55	4	
Enwin	0.44	3	
Geolph	0.28	2	
		1	
Count	16		
Average	0.738		
Range (min, max)	0.28 to 1.25		

**Medium Utilities**

Collus Power	3.90
Grimshy	3.87
Haldimand County	1.67
Newmarket	1.59
Peninsula West	1.30
Chatham Kent	1.24
Huron Hills	1.14
PUC Distribution	1.10
Festival	1.05
Orangeville	0.91
Peterborough	0.80
Woodstock	0.73
Whitby	0.54
Norfolk	0.51
St. Thomas	0.46
Orillia	0.29
Welland	0.25
Count	17
Average	1.286
Range (min, max)	0.25 to 3.90



R68

System Average Interruption Duration Index (SAIDI) excluding Blackout

### Large Utilities

Waterloo North	2.63	
Burlington	1.91	
Kirwin	1.84	1.52
Toronto	1.47	
Hydro One Brantford	1.40	
Hamilton	1.16	
PowerStream	1.02	
Thunder Bay	1.01	
Kitchener-Waterloo	0.97	
Oakville	0.92	
Guelph	0.68	
Greater Sudbury	0.66	
St. Catharines	0.57	
Enbridge	0.29	
Count	14	
Average	1.163	
Range (min, max)	0.29 to 2.63	

Rank  
15  
14  
13  
12  
11  
10  
9  
8  
7  
6  
5  
4  
3  
2  
1

Q1  
Q3

### Medium Utilities

PUC Distribution	4.41
Bluewater	3.80
Halton Hills	3.49
Festival	3.16
Haldimand County	3.04
Aurora	2.66
North Bay	2.00
Woodstock	1.51
Whitby	1.50
St. Thomas	1.39
Norfolk	1.27
Collins Power	1.06
Peterborough	0.92
Orangeville	0.01
Count	14
Average	2.159
Range (min, max)	0.01 to 4.41

### Small Utilities

Kawartha	8.45
Lakeland	1.27



R72

System Average Interruption Frequency Index (SAIFI) excluding Blackout

Large Utilities				
Waterloo North	4.31		15	
Hydro One Brampton	2.43		14	
Envin (seasonal)	2.30	2.19	13	Q4
Toronto	1.98		12	
Burlington	1.92		11	Q3
Thunder Bay	1.80		10	
Guelph	1.74		9	
Kitchener-Waterloo	1.42		8	Q2
Hamilton	1.28		7	
PowerStream	1.24		6	
Oakville	1.10		5	
Greater Sudbury	1.07		4	
St. Catharines	1.06		3	
Leamsource	0.76		2	
Count	14			
Average	1.739			
Range (min, max)	0.76 to 4.31			
Medium Utilities				
Aurora	4.35			
St. Thomas	2.07			
Bluewater	4.03			
Festival	4.02			
PUC Distribution	2.78			
North Bay	2.57			
Haldimand County	1.62			
Norfolk	1.31			
Peterborough	1.15			
Whitby	1.04			
Woodstock	1.01			
Orangeville	0.39			
Collins Power	0.38			
Halen Hills	0.01			
Count	14			
Average	2.052			
Range (min, max)	0.01 to 4.35			
Small Utilities				
Keswold	2.05			
Centre Wellington	1.91			



"Currie, Don"  
<curried@LondonHydro.com>

To: <sfilice@enwinpowerlines.com>  
cc:  
Subject: London Hydro Reliability Stats

02/03/2005 09:44 AM

Hi Shawn:

Please find attached the reliability stats you have asked for.

The published OEB stats include things like the 2003 blackout and any Hydro One related outages. Last year we had several bad Hydro One operations at Talbot TS which affected our stats.

The internal stats remove all the things that are out of London Hydro's control to manage.

Don Currie  
Sub-Stations  
London Hydro  
519-661-5800 Ext. 5726  
Fax: 519-661-5275

-----Original Message-----

**From:** Sheil, Greg  
**Sent:** Thursday, February 03, 2005 8:13 AM  
**To:** Currie, Don  
**Subject:** Reliability Stats

I must warn you these are our internal stats and not necessarily the stats that are published by the OEB. Major Event Days (MED) have been removed. This is not yet an accepted practice by the OEB, hence the difference in published data. I decided to include the OEB stuff. (some of the MED's are due to



Hydro One) Book1.xls

## **Appendix C**

### **An Outage Statistic Evaluation of the EWP System, Agenda Submission – Dated 2005 01 19**

To: T. Kosnik

2004 03 16

M08/FE

From: K. Damphouse

### **An Outage Statistic Evaluation of the EWP System**

#### **Scope:**

This document describes the current outage statistics that EWP has generated for the years 2001, 2002 and 2003 with emphasis on the latter. This document will also analyze these statistics and indicate what indices improvements can be experienced due to recommendations that will follow. These recommendations will be based upon other Utility practices as well as the uniqueness of the EWP system.

The indices in question are as follows:

- SAIDI – Defined as the total outage time that a customer on our system can expect to be out per year (on average).
- SAIFI – Defined as the average number of outages a customer can expect per year.
- CAIDI – Defined as the outage time that a customer will be out PER outage per year (on average).
- ASAI – Defined as the percent time that power was available for the year (on average).
- SAARI – Defined as the average number of momentary outages a customer can expect per year.

**Note:** The Ice storm of 2002 and Blackout of 2003 were excluded from this study, due to the rarity of their occurrences and the amount of monies required to defeat them.

#### **Strategies:**

The main Indicators for the EWP outage statistics are:

- Number of Outages
- Number of Customers affected by Outages
- Number of Customer Hours experienced during Outages



These indicators are the factors that must be decreased to improve the EWP indices. The only way to accomplish this is to follow tried and true methods that other utilities have tried (with success) and look for industry standards that we may currently not be following.

### Outages:

In looking at the outages in detail for the last 3 years, with an emphasis on 2003 (due to it being the 'closest' to the EWP current time), some rather surprising facts come to light. These are as follows:

1. Some feeders are too large in that when an A/R or A happens, 4000 to 5000 customers are affected. The average number of customers per feeder is 1900.
2. Pole top reclosers had hold offs for months on end, thereby allowing what would have been an A/R to severely affect the EWP 2003 indices.
3. EWP operating practices allow for main station breakers to be opened and left open while repairs are made.
4. The vast majority of Customers affected are due to trees in wires (or windy days with no cause – which indicate trees due to the feeders that experienced the outage having the most tree coverage).
5. Animals are minimal in the problems they cause and are easily rectified.
6. Lightning storms, although severe and impactful, do not cause as much damage as earlier suspected.

### Analysis:

We will now look at the above items in detail to see what is actually happening on the EWP system.

#### Part 1

There are a number of feeders in the EWP system that are too large with too many customers as compared to other feeders. See Appendix A – Part 1 for examples.

These feeders when impacted by a tree branch, squirrel, lightning, etc affect the EWP indices heavily due to the large volume of customers affected. In comparing the outages of these feeders to other feeders (with reduced or more average number of customers), it is clear that more outages will be experienced by the larger feeders due to their increased exposure, thereby compounding the problem. This increased exposure due to size makes having very large feeders detrimental to the EWP indices since they will experience more outages due to exposure (and therefore these outages will have a much larger impact due to the number of customers).

A constraint on this is the Essex TS loading restrictions as well as the financial benefit to EWP of maximizing the load on Walker TS #2 which will be considered in the recommendations section.

### **Recommendation:**

It is recommended that EWP look into balancing some of its feeders to minimize the impact to the indices when a fault occurs and a breaker opens. Most notably is the loading of Walker TS # 2. This loading is in place due to financial benefits, yet there are 4000 customers on 3 separate feeders (12,000 total) and one empty feeder bay (55M21). If financial conditions are such that EWP wants to keep the load on Walker TS #2, than at least the load should be shifted around to make best use of this empty feeder bay and help reduce the indices.

This should be done at other stations as well to draw a balance between station loading and the indices, since most of the past studies have mainly dealt with loading and haven't looked at the indices and the impact moving load around will cause.

Other Utilities have an a maximum of 15 – 20 MVA per feeder (London Hydro for example).

It is therefore **highly** recommended that a detailed study of the EWP system be done to balance the EWP system as best possible, while still maintaining load restrictions.

### **Analysis:**

#### **Part 2**

The Joslyn reclosers purchased to sectionalize the EWP system during outages and thereby reduce the indices were not used correctly after the initial installation and therefore caused the EWP indices to dramatically increase. See Appendix A – Part 2 for examples.

The pole top reclosers were a contentious issue with the line staff from an operating perspective and as such they were put in service with a Hold-off in effect on each one of them, thereby not only defeating their purpose, but disabling the main stations breakers from Auto-Reclosing. This in effect had a double effect on the EWP indices, since an A/R that would have occurred, now turned into a sustained outage. In looking at the Appendix A – Part 2 it shows that if the pole top Reclosers were put into service and used as intended, EWP Indices would have been much improved. The SAIDI statistic would have dropped by 10%, SAIFI would have dropped by 21%, CAIDI would have increased and the time power was available ASAI would have remained almost the same. The SAIFI dropped due to the outages moving to the SAARI statistic (A/R as opposed to breaker lock-out) and the CAIDI number went up which is insignificant, due to it being an average time per outage experienced with SAIDI, and SAIFI being the important indices.

### Recommendation:

It is the recommendation of this report that more pole top reclosers be purchased and that more automation be installed on the EWP system. There will be quicker restoral times due to this automation as well as SCADA and therefore the indices will be improved that much more. These pole top reclosers will minimize the feeder size (thereby simulating Part 1 above) and reduce outage sizes when they do occur.

It is also the recommendation of this report that any and all pole top reclosers that are put in service from this point forward are either put into service fully so that EWP can benefit immediately from them or if a permanent Hold Off is required due to the line staff safety fears, then the overhead ILS bypass must be used, thereby placing the units out of service. This must be done in order to avoid the severe detriment to the indices that was experienced in 2003 due to this permanent Hold Off condition being in place for many months.

It is also a recommendation that EWP investigate a fuse burning strategy as opposed to a fuse saving strategy. EWP should be looking at protecting the larger number of customers from extended outages. This was explained in detail by Gene Liu (see file Outage in 2001 – 2002).

### Analysis:

#### Part 3

EWP operating practices allow for main station breakers to be opened and left open while repairs are made. It is apparent from some outages studied that the practice of the crew arriving upon a fire, accident, wires down or even trees in wires is to call the operating staff and have the main breaker opened. This is logical in that it is usually the quickest way to isolate the problem. However, there are a few outages that show that this is not the best solution to improve the indices. See Appendix A– Part 3 for an example.

In the example it can be seen that the SAIDI drops 5.6%, SAIFI drops 2.1% and CAIDI drops 3.5% due to the removal of 1 outage that was dealt with incorrectly due to bad operating practices. These practices are very detrimental to the EWP indices. This is one outage that caused a 5% increase in the SAIDI statistic, was avoidable and cost EWP almost \$1600 in lost revenue.

### Recommendation:

It is apparent that the biggest detriment to the EWP indices (besides trees in wires) are the operating practices of the EWP staff.

It is the recommendation of this report that the staff be gradually shifted from a mentality of a 'repair' utility to a 'restore' utility. What this means is that when staff come upon a fire, accident, trees in wires or anything that they feel requires a

breaker to be opened, they are to have in their minds (line staff and operating staff) that the main purpose is to isolate the problem and then restore as many customers as possible. This is different than existing practices where a breaker is opened, the situation assessed to see how long it might take to repair and then work begins. This is very detrimental to the indices and as such, EWP should implement an arrival, isolate (by breaker if necessary, but the nearest LBS would suffice) then restore as many as possible by opening an LBS, calling the operating staff to have the breaker restored to service, then repairs can begin. When repairs are complete, then the LBS can be closed to pick up the small portion of the feeder. A customer may have to be cut clear, the breaker can be restored, then the repairs can begin. There will be instances where this is slightly overkill, but this may have to be a judgment call on the staff's part (due to years of experience in the field), but the priority after safety must be restoration and not repair.

Implementation of this type of work procedure in EWP is going to be difficult due to the increase in work required by field staff, but it is a utility standard in other utilities and is what is required to keep the indices low.

#### Analysis:

##### Part 4

The main outage cause on the EWP system that is the most impactful and can be investigated/controlled seems to be trees in the EWP plant. This is mainly due to the large number of overhead feeders in the EWP system that run through heavily treed areas of the city. The number of outages and the stats on these outages are shown in Appendix A – Part 4.

In looking at the Appendix A – Part 4, it can be seen that if all the tree related outages in 2003 could have been reduced to zero, SAIDI would have dropped by 42%, SAIFI would have dropped by 43% and CAIDI would have stayed relatively the same. Eliminating all tree outages is difficult to do, but with these large indices, this is a definite goal that should be strived for. This is the 'biggest bang for the buck' philosophy.

In investigating the outages affecting the EWP system it became apparent that there were a significant number of tree in wire outages which heavily affected our indices as well as outages on very windy days with no apparent cause. These outages occur mainly on feeders in heavily treed areas, indicating tree contact.

#### Recommendation:

It is the recommendation of this report that the feeders with the most tree coverage be looked at by someone driving the entire length of the feeder and marking on a

map where there is heavy tree coverage. These marked up maps can then be used to have insulated conductors installed in only the areas requiring it (not whole feeders since may be great lengths with no trees anywhere near wires). EWP should use aerial cable or some other type of insulating material to cover these lines and minimize tree contact. If there are single phase run-offs that are heavily treed, than a fused tap should be installed instead as a cost saving measure (which will be effective due to the fuse burning methodology).

Toronto Hydro as well as London Hydro have installed covered wire (aerial cable) in heavily treed areas with great success.

The cost of this covered wire is approximately 35% over the cost of regular wire and as such it should be used where EWP is doing 4.16 kV conversions in heavily treed areas. This would improve the indices even though EWP is increasing 27.6 kV feeder lengths (see Part 1), which is a double bonus.

Tree trimming should be maintained in these areas as well to minimize contact and follow ups should be done to insure the trimming is done properly and to specification. This may be undertaken by a light duty person to minimize cost to EWP.

The following feeders require immediate attention: 24M3, 24M4, 25M7, 55M22, 55M23, 55M25 and 25M10.

### **Analysis:**

#### **Part 5**

One outage cause that has been thought to have been a very large factor in the outages experienced on the EWP system has been animals. Animals as a whole do not cause a significant number of outages per year on the EWP system as can be seen in Appendix A – Part 5.

In looking at the Appendix A – Part 5, it can be seen that if all the animal related outages in 2003 could have been reduced to zero, SAIDI would have dropped by 1.5%, SAIFI would have dropped by 2.6% and CAIDI would have increased by 1.2%. Eliminating all animal outages is difficult to do due to the small number of outages occurring, the randomness of them and the small impact they have on the total system.

### **Recommendation:**

Due to the small number of animal outages that are experienced it is recommended that the locations that would most heavily impact the statistics be retrofitted to minimize the damage by animals. This entails covering all exposed terminals on top

of Substation transformers as well as the potheads being fed from the substations with some sort of insulating wrap that will eliminate animal contact.

The animal guards that are currently being installed on pole top transformers is the correct direction for EWP due to the large number of customers involved in an outage on a 27.6 kV feeder.

Any installation of Aerial cable, insulated conductors or better tree trimming in heavily treed areas as outlined in Part 4 will significantly reduce animal contact as well. This is mainly due to the fact that these are the areas most frequented by squirrels, crows, raccoons etc.

### **Analysis:**

#### **Part 6**

Lightning storms, although severe, do not cause as much damage as earlier suspected to the EWP system. The analysis of the outage statistics show that there are a number of lightning outages, but most become Auto-Recloses (A/R's) with the rest affecting the system, but not as the worst cause (that would be trees in wires).

In looking at the Appendix A – Part 6, it can be seen that if all the lightning related outages in 2003 could have been reduced to zero, SAIDI would have dropped by 9.7%, SAIFI would have dropped by 11.1% and CAIDI would have increased by 1.5%. Eliminating all lightning outages is near impossible due to the randomness of them as well as the severe nature of a lightning stroke.

### **Recommendation:**

Due to the inconclusive nature of the many studies done by large utilities throughout North America on lightning and surge protection, it is recommended that EWP continue with installing surge arrestors on the system.

### **Final Conclusions:**

To implement the above ideas, techniques and be successful, it will require a dedicated effort on the part of the EWP staff.

The most daunting part will be the requirement of a person to check all outages that occur to confirm if certain methodologies are actually being followed (or not). This person will have to meet with the Trouble Dept, OH, UG and Operating staff to question (in a non accusational tone) the current practices and reinforce the new methods and thinking until such time that the EWP staff's mindset shifts to a restore as opposed to a repair mentality.

An attached Appendix B showing the # of outages caused by Lightning, Animals and Tree contact has been included showing the years 2001, 2002 and 2003 for comparison purposes. In looking at Appendix B, it can be seen that Trees in wires has the largest impact to the EWP indices for all three years, further re-inforcing the need for better tree trimming or covered conductors.

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SCADA Manager  
Kevin Damphouse

Kd/kd



## AGENDA SUBMISSION

**To:** EnWin Powerlines Ltd. Board of Directors

2005 01 19

M35

**From:** Shawn Filice

**Re:** Service Quality – 2004 System Reliability, AS AT JANUARY 1<sup>ST</sup>, 2005

In 2003, EnWin Powerlines was 12<sup>th</sup> overall (for both SAIDI and SAIFI), for Large Utilities in Ontario (out of 14) for outage reliability statistics as shown in Table 1.

	2003 Enwin Powerlines	2003 PROVINCIAL AVERAGE	% VARIANCE
SAIDI (hrs.)	1.84	1.181	+ 35.8%
SAIFI	2.30	1.739	+ 24.3%
CAIDI (hrs.)	0.80	0.682	+ 14.7%

Table 1: 2003 Reliability Statistics "AT A GLANCE"

In 2004, EnWin Powerlines Ltd. had established a corporate goal to improve system reliability by 15% for the Calendar year. This was measured by comparing the year's reliability indices against the previous 3-year average (See the attached Outage Summary Statistics for details) reduced by 15%.



	2004 EnWIN POverlines	2004 Goal (15% Reduction)	% VARIANCE	2003 PROVINCIAL AVERAGE	% VARIANCE (Provincial Average)
<b>SAIDI (hrs.)</b>	1.2194	1.3211	- 8.4%	1.181	+ 3.1 %
<b>SAIFI</b>	2.7566	2.0195	+ 26.7%	1.739	+ 36.9%
<b>CAIDI (hrs.)</b>	0.4424	0.5566	- 25.8%	0.682	- 53.4%

**Table 2: 2004 Reliability Statistics "AT A GLANCE"**

The 2004 statistics in Table 2 show that EnWin customers experienced an increase in the average number of 'outages' experienced (SAIFI up by 26.7%) with a large decrease in the average duration of these outages (SAIDI down by 25.8%) as compared to the 3 year average goal.

Assuming the MEARIE 2004 Provincial large users statistics are the same as 2003, Table 2 draws a comparison between the 2004 Enwin and MEARIE numbers. SAIFI is larger due to the large number of affected customers, yet we realized a 53 % reduction in CAIDI (average length of interruption). This is an upward trend in the quality of power for the Enwin customers.

**SAIDI** – Defined as the **average interruption duration for customers served during the year**. EnWIN's 2004 SAIDI was 1.2194 hours (1 hour, 13 minutes and 10 seconds). The 2004 benchmark for SAIDI average was 1.3211 hours (1 hour, 19 minutes and 16 seconds). This compares against the MEARIE 2003 Provincial large users SAIDI value of 1.181 (1 hour and 11 minutes)

**SAIFI** – Defined as the **average number of times that a customer is interrupted during the year**. EnWIN's 2004 SAIFI was 2.7566 interruptions per customer. The 2004 benchmark for SAIFI was 2.0195 interruptions per customer. The 2003 Provincial average is 1.739 interruptions per customer.

**CAIDI** – Defined as the **average length of an interruption**. EnWIN's 2004 CAIDI was 0.4424 hours (26.5 minutes). The 2004 benchmark for CAIDI was 0.5566 (33 minutes). The 2003 Provincial average is 0.682 hours (41 minutes).

Nearly 44% (100,000 customers) of the SAIFI statistic resulted from weather activity such as lightning and windstorms. Planned Capital (i.e. 4.16kV conversions and connection of new services) and Maintenance activities (i.e. PCB Oil Sampling and isolation of energized conductors for safe work practices) affected approximately 44,000 customers thereby explaining 20% of the statistic. 10% or 42,000 customers were impacted due to the loss of supply from Hydro One and other factors such as defective equipment, public vehicle accidents, animal contacts make up the remaining 26%.

Even though the SAIFI statistic shows there were 26.7% more customers affected in total, these same customers experienced a 25.8% decrease in the average outage duration. We were able to achieve this due to a 'new' (or renewed) philosophy that was implemented in the early part of 2004. Rather than reacting in a "knee jerk" fashion, our staff, now take a

moment to think through the most 'efficient' method of restoration that will have the least impact on the customers prior to dispatching crews.

Analyzing these statistics indicates we met the SAIDI and CAIDI expectations, however, we failed with respect to the SAIFI goal. Being ahead of the SAIDI and CAIDI statistics is very positive considering there was a high volume of system activity due to a number of thunderstorms during the month of May.


Even though the majority of our outages stem from uncontrollable factors such as the loss of supply from Hydro One, weather and defective equipment. The frequency of these interruptions and the number of customers impacted can be minimized.

We employ a variety of maintenance activities and install specific materials to help us address the tree, animal and pole fire concerns. Our "Annual Insulator Washing program" is in place to minimize the occurrences of pole fires, our "Annual & Area Tree Trimming contracts" are in place to deal with the tree contact incidents, and "Animal Guards" are installed on all transformer bushings to deter animals from getting too close to energized equipment.

Our capital programs such as Recloser and "fused-tap" installations minimize the number of customers impacted when outages occur. There are now 32 pole-mounted reclosers connected to the system, which have helped to improve system reliability by 5% since July.

**RECOMMENDATION:**

For information purposes only.



Director of Operations

SF/dl

Attach.

**Appendix D**  
**Historic Outage Data and Analysis**

### Historical data analysis on fault sections

Customer-hours caused by faults on first half of 27.6 kV feeders*	44,633.6	
Customer-hours caused by faults on Second half of 27.6 kV feeders	56,131.4	
% First/(First+Second)		44%
% Second/(First+Second)		56%
Total Customer-hours caused by unknown reasons	95,089.4	
Spreading Customer-hours caused by unknown reasons to the first half of 27.6 kV feeders.	42,119.6	
Spreading Customer-hours caused by unknown reasons to the second half of 27.6 kV feeders.	52,969.8	
Total Customer-hours on the first half of 27.6 kV feeders between 2000 and 2003	86,753	
Calculated annual Customer-hours on the first half of 27.6 kV feeders	21,688	
Average annual system customer-hours	125,062	
Percentage of Customer-hours on the first half over total Customer-hours **	17%	

Note: \* The historical data used are from 2000 to 2003 database

\*\* Only faults that caused breaker trips are considered in the analysis.

## Historical outflow data from 2000 to 2003

LINE OF BUSINESS	PRODUCT	DATE	AMOUNT	PERIOD	DESCRIPTION
20010029	0.75	1238	1028.0	First half	2001
20000309	0.40	2700	1090.0	First half	2001
20010130	0.03	3833	109.0	First half	2001
20000308	0.03	1838	41.0	First half	2001
20000306	0.03	1388	41.0	First half	2001
20021007	0.03	2751	82.5	First half	2001
20020017	0.03	1340	40.2	First half	2001
20000203	0.05	2825	235.4	First half	2001
20001110	0.03	3525	105.8	First half	2001
20010522	0.03	3525	105.0	First half	2001
20000622	0.03	1691	50.7	First half	2001
20000615	0.05	1308	83.3	First half	2001
20010022	0.03	1305	38.2	First half	2001
20010301	0.03	3079	92.4	First half	2001
20000414	0.08		0.0	First half	2001
20000201	0.05	6	0.3	First half	2001
20030023	0.05	5125	200.4	First half	2002
20030028	0.05	4071	203.8	First half	2002
20010414	0.08	197	10.8	First half	2001
20010622	0.03	50	1.5	First half	2001
20020718	0.03	2130	63.9	First half	2002
20020718	0.08	3573	245.8	First half	2002
20020819	0.07	3104	227.5	First half	2002
20001012	0.03	3184	54.9	First half	2001
20030612	0.05	3184	159.2	First half	2003
20030407	0.05	2311	115.8	First half	2003
20030407	0.03	1490	44.7	First half	2003
20000924	0.03	1817	54.5	First half	2000

Historical outage data from 2000 to 2003

20010422	0.03	1817	64.5 First half	55M5	55M5 CUSTOMERS
20010524	0.10	727	72.7 First half	55M6	55M5 CUSTOMERS INCLUDING STN 71
20020417	0.03	3024	90.7 First half	55M7	55M7 CUSTOMERS
20020816	0.72	1383	121.3 First half	15M11	15M11 CUST.
20020728	4.23	3533	728.5 First half	15M6	15M6 CUSTOMERS
20020708	0.52	4336	2514.7 First half	15M7	15M7 CUSTOMERS
20030621	0.03	4836	145.1 First half	15M7	15M7 CUSTOMERS
20030815	0.53	1086	565.0 First half	15M6	15M6 CUST.
20020113	0.05	2825	226.0 First half	25M6	25M6 CUSTOMERS (INCL. STN 72)
20010222	0.05	3525	176.3 First half	25M7	25M7 CUSTOMERS (INCLUDING STN 59, STN 5872)
20010222	0.07	1591	118.4 First half	25M11	ALL 25M11 & 25M12 CUSTOMERS (INCLUDING STN 2271 CUSTOMERS)
20010222	0.07	1306	91.4 First half	25M10	ALL 25M10 & 25M14 CUSTOMERS INCLUDING STN 42 & STN 68
20010222	0.05	3079	154.0 First half	25M7	ALL 25M7 CUSTOMERS (INCLUDING STN 51)
20010121	0.03	50	1.5 First half	55M5	ALL 55M5 CUSTOMERS EXCEPT FORD'S POWERHOUSE
20000509	0.85	1817	184.5 First half	55M6	55M6 CUSTOMERS
20020309	0.20	1683	336.8 First half	15M11	15M11 CUSTOMERS
20020825	0.07	2147	150.3 First half	15M11	15M11 CUSTOMERS
20030623	0.17	1683	286.1 First half	15M11	15M11 CUSTOMERS
20010808	0.15	4003	670.5 First half	15M14	15M14 CUSTOMERS
20000318	2.30	5179	8301.2 First half	25M4	25M4 CUST.
20010905	1.28	3179	4036.1 First half	25M1	25M1 CUSTOMERS
20000318	4.10	3525	2877.5 First half	25M7C	25M10 CUSTOMERS INCL. STA 58 & 59
20000411	0.25	3525	891.3 First half	25M1C	25M10 CUSTOMERS INCL. STN 59
20010811	1.30	1683	2136.3 First half	25M11	REMAINING 25M11 CUST. INCLUDING SUB. 54
20000213	0.12	1306	102.4 First half	25M13	25M13 CUSTOMERS
20011024	0.52	1306	679.1 First half	25M13	REMAINING 25M13 CUSTOMERS NORTH OF CAMPBELL AVE. AND TECHUMSEH RD.
20020309	0.57	1683	1126.0 First half	55M2	55M2 CUSTOMERS
20010818	2.03	2200	4200.0 First half	55M22	REMAINING 55M22 CUSTOMERS EAST OF NORMAN NORTH OF TECHUMSEH
20010622	1.73	48	83.4 First half	55M5	55M5 CUST EXCEPT FORD POWERHOUSE TRANSFERRED TO 55M6 AT ENWIN'S POWER
20020719	0.30	2130	639.4 First half	55M6	55M6 CUSTOMERS (55M5 CARRYING 55M22 & 55M12)
20020718	0.10	2130	213.0 First half	55M5	55M5 CUSTOMERS (55M5 CARRYING PART OF 55M22 & 55M12)
20030407	1.03	2311	3687.8 First half	55M2	55M2 CUSTOMERS (INCL. STN 52)
20000223	0.40	727	280.0 First half	55M5	55M5 CUSTOMERS INCLUDING STN 71
20010319	0.03	4177	125.3 First half	55M22	55M22 CUSTOMERS INCL. 51

Historical outage data from 2000 to 2003

DATE	TIME	LOCATION	REASON	STATUS	REMARKS
20000618	0.02	473	9.5 Second half	15M15	15M15 CUSTOMERS (INCL. STA. 41 & 57)
20000508	0.06	1066	53.3 Second half	15M3	15M3 CUSTOMERS (STN. 58 AUTO TRANSFERRED TO 25M10)
20000428	0.03	970	28.3 Second half	25M2	25M2 CUSTOMERS
20000618	0.03	528	15.2 Second half	25M6	25M6 CUSTOMERS
20000725	0.03	76	0.5 Second half	24M1	24M1 CUSTOMERS
20000925	0.03	10	0.5 Second half	24M1	24M1 CUSTOMERS
20001024	0.03	33	40.2 Second half	24M5	24M5 CUSTOMERS
20000728	0.03	1310	1.1 Second half	24M2	24M2 CUSTOMERS
20000201	0.07	2825	107.8 Second half	24M5	24M5 CUSTOMERS
20000306	0.05	2825	141.3 Second half	24M5	24M5 CUSTOMERS
20000306	0.03	2825	84.8 Second half	24M5	24M5 CUSTOMERS E. OF LABELLE E. SIDE OF HURON CHURCH TO DOUGALL
20001115	0.28	3525	987.0 Second half	25M10	25M10 & 15M5 CUSTOMERS
20000912	0.03	1691	50.7 Second half	25M11	25M11 CUSTOMERS (EXCEPT STN 54)
20000306	0.116667	2983	348.0 Second half	25M14	25M14 CUSTOMERS
20000715	0.03	2083	80.5 Second half	25M14	REMAINDER OF 25M14 CUSTOMERS (EXCEPT SITES 744, 1586)
20000708	2	3079	6158.0 Second half	25M7	25M7 CUSTOMERS INCLUDING STN. 57
20000306	0.1	3079	307.9 Second half	25M7	25M7 CUSTOMERS INCLUDING STN. 57
20000306	0.03	3535	106.1 Second half	25M7	25M7 INCLUDING STATION 27 & 25M14 SOUTH OF SHEPHERD, EAST OF CHAWWORTH
20001109	0.03	6251	187.5 Second half	25M2	25M2 INCLUDING STATION 27 & 25M14 SOUTH OF SHEPHERD, EAST OF CHAWWORTH
20000415	0.03	6251	187.5 Second half	25M2	25M2 INCLUDING STATION 27 & 25M14 SOUTH OF SHEPHERD, EAST OF CHAWWORTH
20000704	0.98	6251	24879.0 Second half	25M2	25M2 CUSTOMERS EAST OF WESTMINSTER & NORMAN, N. OF TEC. (POLONA PARK)
20000704	1.9	6251	11876.9 Second half	25M2	25M2 CUSTOMERS EAST OF WESTMINSTER.
20000602	0.03	1407	42.2 Second half	25M2	25M2 CUSTOMERS PART OF 24M4 CUSTOMERS & 24M5 CUSTOMERS (INCL. STN 67)
20000721	0.03	2130	63.9 Second half	25M5	25M5 CUSTOMERS (INCLUDING SECT. OF 25M2 & 25M2)
20000306	0.03	3164	54.9 Second half	25M1	25M1 CUSTOMERS
20000306	0.03	3164	108.2 Second half	25M1	25M1 CUSTOMERS
20000203	0.1	4989	458.9 Second half	25M2	25M2 CUSTOMERS INCLUDING STN 62
20000519	0.43	4989	2145.3 Second half	25M2	25M2 CUSTOMERS INCLUDING RHODES DR. OPERATING CENTRE AND STN 62
20000528	0.03	4989	149.7 Second half	25M2	25M2 CUSTOMERS INCLUDING RHODES DR. OPERATING CENTRE STN 61 & 62
20000513	0.03	4989	149.7 Second half	25M2	25M2 CUSTOMERS
20000808	0.55	4989	2744.0 Second half	25M2	25M2 CUSTOMERS (INCL. STA. 62)
20000723	0.57	4989	2842.7 Second half	25M2	25M2 CUSTOMERS EXCL. STN 62
20000327	0.07	1490	104.3 Second half	25M3	25M3 CUSTOMERS
20000614	0.46	1490	715.2 Second half	25M3	25M3 CUSTOMERS
20000422	0.03	1490	44.7 Second half	25M3	25M3 CUSTOMERS
20001024	0.03	1817	54.5 Second half	25M5	25M5 CUSTOMERS
20001008	0.03	1817	54.5 Second half	25M5	25M5 CUSTOMERS
20000712	0.03	1817	54.5 Second half	25M5	25M5 CUSTOMERS
20000904	0.03	1817	54.5 Second half	25M5	25M5 CUSTOMERS
20000202	0.07	2024	211.7 Second half	25M7	25M7 CUSTOMERS
20000817	0.03	2875	88.3 Second half	25M8	25M8 CUSTOMERS INCLUDING 25M7 CUSTOMERS E. OF FLORENCE
20001008	0.03	1683	30.5 Unknown	15M1	15M1 CUSTOMERS
20001103	0.06	1683	134.6 Unknown	15M1	15M1 CUSTOMERS
20000330	0.03	4003	120.1 Unknown	15M14	15M14 CUSTOMERS
20001004	0.03	4003	120.1 Unknown	15M14	15M14 CUSTOMERS

[illegible]



Historical outage data from 2000 to 2003

20000726	0.03	3079	92.4	Unknown	25M7	25M7 CUSTOMERS (INCL. SUB 61)
20000726	0.03	3079	92.4	Unknown	25M7	25M7 CUSTOMERS (INCL. SUB 61)
20020309	0.33	2056	975.5	Unknown	25M7	25M7 CUSTOMERS
20031111	0.13	3079	400.3	Unknown	25M7	25M7 CUSTOMERS
20020201	0.87	3535	2363.5	Unknown	55M2	55M2 CUSTOMERS
20020201	0.22	3535	777.7	Unknown	55M2	55M2 CUSTOMERS & 15M5 CUSTOMERS
20020201	0.1	3535	353.5	Unknown	55M2	55M2 CUSTOMERS
20020201	0.08	3535	282.9	Unknown	55M2	55M2 & 15M5 CUSTOMERS
20020131	0.17	6251	1082.7	Unknown	55M2	55M2 CUSTOMERS
20020131	0.06	6251	312.6	Unknown	55M2	55M2 CUSTOMERS 10% 55M2 CUSTOMERS
20020131	0.06	6251	312.6	Unknown	55M2	55M2 CUSTOMERS
20020201	0.05	6251	312.6	Unknown	55M2	55M2 CUSTOMERS
20020131	0.06	3596	287.8	Unknown	55M2	55M2 CUSTOMERS INCL. STN. 53 & 57
20020201	0.05	3596	179.9	Unknown	55M2	55M2 CUSTOMERS
20020201	0.03	3596	107.9	Unknown	55M2	55M2 CUSTOMERS
20020201	0.03	3596	107.9	Unknown	55M2	55M2 CUSTOMERS
20020131	0.87	2509	2433.7	Unknown	55M2	55M2 CUSTOMERS INCLUDING SECTION OF 24M4 & 24M5 INCL. STN. 67
20020131	0.1	2509	250.9	Unknown	55M2	55M2 CUSTOMERS INCLUDING SECTION OF 24M4 & 24M5 INCL. STN. 67
20021103	0.28	2509	702.5	Unknown	55M2	55M2 CUSTOMERS (INCL. PART OF 24M4 & 24M5 OCTS.)
20021125	0.03	2509	75.3	Unknown	55M2	CUSTOMERS OF 55M2, 30% OF 24M4, 66% OF 24M5 INCLUDING STATION 67.
20021209	0.07	2509	175.6	Unknown	55M2	55M2 CUSTOMERS (ALSO CARRYING 24M5 CUSTOMERS S. OF SOUTH CAMERON, FROM
20030704	0.2	2509	501.8	Unknown	55M2	55M2 CUSTOMERS
20020131	0.3	3194	954.2	Unknown	55M2	55M2 CUSTOMERS
20030704	0.6	3194	1916.4	Unknown	55M2	55M2 CUSTOMERS & 24M3 CUSTOMERS E. OF HOWARD
20020131	0.83	4619	291.0	Unknown	55M3	55M3 CUSTOMERS
20020201	0.16	4619	692.0	Unknown	55M3	55M3 CUSTOMERS
20021110	0.05	4619	231.0	Unknown	55M3	55M3 CUSTOMERS
20020131	0.25	2130	532.5	Unknown	55M5	55M5 CUSTOMERS
20031112	0.03	2130	53.9	Unknown	55M5	55M5 CUSTOMERS
20020131	0.77	3164	2436.3	Unknown	55M1	55M1 CUSTOMERS
20021013	0.42	3164	1328.9	Unknown	55M1	REMAINDER OF 55M1 CUSTOMERS
20021013	0.2	3164	632.8	Unknown	55M1	55M1 CUSTOMERS
20021013	0.03	3164	94.8	Unknown	55M1	55M1 CUSTOMERS
20001928	0.88	4989	3597.5	Unknown	55M2	55M2 CUSTOMERS
20010630	0.02	3164	63.3	Unknown	55M2	55M2 CUSTOMERS INCLUDING SUB 62
20020131	0.05	4989	240.5	Unknown	55M2	55M2 CUSTOMERS
20000204	2.63	1490	3973.7	Unknown	55M3	55M3 CUSTOMERS (INCL. STN. 63)
20020201	0.47	1490	700.3	Unknown	55M3	55M3 CUSTOMERS
20020201	0.03	1490	44.7	Unknown	55M3	55M3 CUSTOMERS
20020201	0.03	1490	44.7	Unknown	55M3	55M3 CUSTOMERS
20020201	0.03	1490	44.7	Unknown	55M3	55M3 CUSTOMERS
20000629	0.23	3024	580.5	Unknown	55M7	55M7 CUSTOMERS (INCL. SUB 61)
20000602	0.03	3024	90.7	Unknown	55M7	55M7 CUSTOMERS
20020201	0.42	3024	362.9	Unknown	55M7	55M7 CUSTOMERS
20020201	0.06	3024	241.9	Unknown	55M7	55M7 CUSTOMERS
20021013	1.57	3024	4747.7	Unknown	55M7	REMAINDER OF 55M7 CUSTOMERS E. OF SOLIDARITY TOWER
20021013	1.07	3024	3335.7	Unknown	55M7	55M7 CUSTOMERS (INCL. STN. 63)
20021013	0.37	3024	1118.5	Unknown	55M7	55M7 CUSTOMERS
20020309	0.03	3833	109.0	Unknown	15M5	15M5 CUSTOMERS

**Appendix E**  
**Other Utilities Experience on Loop Scheme**



## **DISTRIBUTION RELIABILITY USING RECLOSERS AND SECTIONALISERS**

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### **I. Introduction**

This paper presents a comparative analysis of distribution reliability improvements that can be achieved by using various outdoor distribution devices. There are two objectives for this paper: First, it is to discuss the application of the most common types of devices, including line reclosers, automatic sectionalisers and manual switches. Second, an analysis to quantify the reliability improvements that can be achieved by using each (or a combination) of these devices, as well as a combination of these devices.

As background on distribution reliability and the need for its improvement, one explanation is as follows. De-regulation has resulted in a major cost cutting at many utilities. These cost cuts in equipment, crew size, maintenance, etc., could mean major reductions in reliability. State utility commissions, hearing these concerns, have reacted by requiring the reporting of reliability indices and in some states setting performance standards. In some cases, mandates, penalties and awards have been enacted or are being considered. The question to the utility is, quite frankly, how do I increase reliability at the lowest possible cost? Add to this concern the fact that power quality for sensitive loads has created many new areas of concern (momentaries and sags might be just as bad as sustained feeder interruptions) and you have the dilemma virtually every utility in the world is facing. Reclosers, sectionalisers and switches address these concerns.

In the application section of this paper, mechanical and electrical aspects of each type of switching device will be discussed. For reclosers, by example, the common configurations (i.e., single phase, three phase, loop systems) and ratings will be covered. Advantages and disadvantages of each type of apparatus will be discussed relative to the other types of switching devices. In the reliability section, typical System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI), and Momentary Average Interruption Frequency Index (MAIFI) values for several radial and loop configurations utilizing reclosers, sectionalisers and switches will be presented. The Customer Average Interruption Duration Index (CAIDI) will not be covered since there is no significant difference between device selection as it applies to the restoration of permanent faults. I.e., it takes approximately as long to close reclosers after a permanent fault as it does for sectionalisers and switches.

In the comparison section of this paper, three-phase reclosers with single phase tripping capability and single phase switches will be compared to three phase gang operated devices in the same applications. Three phase reclosers with single phase capability devices have become more commonplace with the development of

magnetic actuation, and brought into the market as a tool specifically to improve distribution reliability.

There are a number of papers written on improving reliability directed towards one type of device (i.e., reclosers, sectionalizers or switches) in various configurations. This paper is geared toward comparing and utilizing a combination of these equipment types to gain the highest possible reliability improvements. This includes conventional configurations, as well as some non-conventional configurations worthy of exploration.

## **II. Distribution Reclosers**

Reclosers have been around for a long time and have always been considered one of the "workhorses" of distribution system overcurrent protection. A distribution recloser is designed to interrupt both load and fault current. Also, per its term, it is designed to "reclose" on the fault repeatedly in a predefined sequence in an attempt to clear the fault. Reclosers are predominantly located on the distribution feeder, though as the continuous and interrupting current ratings increase, they are more likely now to be seen in substations, where traditionally a circuit breaker would be located.

Reclosers have two basic functions on the system, reliability and overcurrent protection. While one of the philosophies for the use of reclosers is to increase reliability, in the past their use for many utilities was determined primarily because the feeder breaker did not have protective reach to the end of the feeder. This was due to the fact that high load currents forced the minimum trip setting to a higher value than the fault level at the end of the feeder. Nowadays, reclosers are more frequently applied for reliability reasons, mainly due to three of their benefits: Reclosing capability, single phase reclosing, and automated loop capabilities.

**Reclosing:** Reclosing, for over 30 years, was normal for virtually all utilities since most lines were overhead and most temporary faults could be cleared by the recloser before the fuse operated (feeder selective relaying). Modern reclosers have open times as low as 100 milliseconds, allowing consumer power quality devices such as microwaves and clocks to not be affected by momentaries.

**Single-phase Reclosing:** Single phase reclosers for main line feeders are more readily available. Traditionally, single phase reclosers operated as standalone devices with no electrical or mechanical connection between phases, and had lower interrupting ratings. Modern reclosers, however, reclosers with three phase tanks and higher interrupting ratings have been introduced which have 1 phase reclosing capability. Single phase tripping yields significant improvements in reliability, as demonstrated later in this paper.

**Automated Recloser Loop Systems:** Reclosers can be configured to work together in an automatic restoration system. Automatic restoration provides a significant improvement in the SAIDI and SAIFI index, with common applications including 3, 4 or 5 reclosers. Protection on single phase basis can compliment loop systems to further

improve reliability. This paper is intended to compare reclosers, sectionalisers and switches, in the most common arrangements of up to three devices (2 midpoints and one tie) outside the substation. Using more than 3 units on the system further improves the reliability of a given system.

In addition to the protective and reliability benefits, reclosers with newer, more sophisticated controllers have several additional useful features for application on distribution feeders:

- **Directionality** - The increased use of distributed resources and automation may make the ability to trip in each direction with different settings a requirement.
- **Under/Over Voltage and Frequency** - The ability to monitor, alarm and control on these power quality events. Underfrequency shedding may be necessary or mandated in some regions of the country.
- **Power Quality Monitoring** - Performance based rates will force utilities to monitor their system performance at all levels.
- **Load Monitoring** - Equipment loading will become a much greater issue as higher loading of equipment to reduce costs becomes a factor. The recloser could monitor this.
- **Fault Monitoring** - Information such as coordination success,  $I^2t$ , fault levels, success of reclosing sequences, oscillographic capture, etc., provide utilities with data to improve system performance at virtually no cost.
- **Flexibility** - Since no one can predict the future, especially in the environment we find ourselves today, one of the major requirements of any intelligent device is that it must be flexible to changing system needs. Reclosers can easily be reprogrammed with settings to match existing conditions.

### III. Sectionalisers

Sectionalisers can either take the form of a cutout with a CT ring around the tube and an electronic actuation module, or they may take the form of a solenoid/actuator driven devices with 6 bushings. Three phase sectionalisers are devices which often look similar to reclosers, but they have different functionality. The term "Sectionaliser" is not to be confused with the generic term "Sectionalising" device, which is sometimes referred to as the first recloser (outside the substation) in an automated loop restoration system. The functionality of this device is significantly different.

The function of a sectionaliser is not to interrupt a faulted line, but instead count the fault occurrences on the line and upon a predefined number of counts, and open up when the line is de-energized. The interrupting device, which allows the counting action, is either an upstream recloser or circuit breaker in the substation.

Sectionalisers are often used in locations where coordination with other devices is difficult due to tight coordination curves, or they can be used in place of fuses in high fault current areas (i.e. single or three phase taps near the substation) where it is difficult to coordinate with the fuse. In either case, sectionalisers perform only as a feeder selective ("save the tap") arrangement, requiring the main line device to operate in order to open. This may be disadvantageous where there are critical loads on the main feeder, where a reduction in MAIFI is important.

Though sectionalisers are generally lower cost than reclosers, they have several features useful for the utility:

- **Discrete Timing** – Detailed coordination study is not required.
- **Independent Phase Operation** – Some models have the capability to sectionalize on a single phase basis.
- **Cold Load Override** – If the recloser has been in the open state for some time, it is possible to have the sectionaliser "count" which can cause a miscoordination event. Newer controls can make the counting dependent on voltage, which can prevent this circumstance.
- **One Shot Mode** – Some sectionalisers can be switched over to one shot mode for safety purposes or to reduce the number of main feeder interruptions.

#### IV. Switches

Manual and motor operated switches are the most basic type apparatus on the line. These are typically air break devices which are not typically designed for automatic operation and are for local (and occasionally remote) operation. These devices are useful for manual temporary restoration of faulted lines, where if several are used can be useful to reconfigure a line manually to regain as much of the segments as possible after a fault. The problem with switches is mostly time. Without remote capability, a manual switch operation can take up to 1 hour, significantly impacting the overall feeder reliability.

Basic switches are typically lower in cost and provide the following features for the utility:

- **Simple device** – Undoubtedly the simplest device on the system.
- **Motor operation** – Can have motor operation to improve restoration time through SCADA.
- **Provides Visible Break** – External switch blades provide visible break for line work.
- **Often have capacitor ratings or are dedicated for capacitor switching.**

## V. Reliability Comparisons

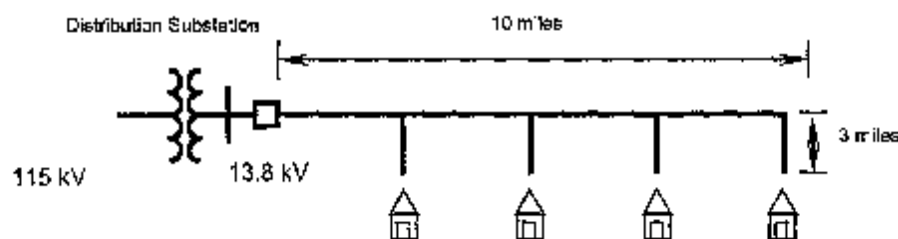
As mentioned previously, in the past feeder reclosers were primarily installed because of the need to see faults further on the line, sectionalisers in place of fuses for more defined protection, and switches were applied for reconfiguration of the feeder due to loads and manual fault restoration.

Now, these devices play a key role in meeting performance measures mandated by PUC's and demanded by customers. The question for the engineer is: Which device(s) will give the greatest reliability benefits? To assist the engineer in making decisions, including types and locations of devices on the feeder, detailed modeling programs are available. A modeling program can determine for a feeder or group of feeders the optimal location and quantity of devices that will yield the greatest reliability, taking the guesswork out of the task.

The reliability values in this paper were obtained using an analytical reliability analysis program created by ABB Consulting, which is designed to determine the best methods for improving reliability of a given feeder or system. For the purposes of this paper, an example feeder (Figure 1) is used for reliability comparisons. The specific parameters and assumptions are for a typical suburban/rural circuits and are as follows:

- 10 miles of 3-Phase 13.8 kV Main Feeder
- 8 single-phase laterals, evenly distributed on the main feeder. Each lateral 3 miles long, and connected to the main feeder through a fuse
- A total of 1800 customers (8 x 225 customers/lateral)
- Parameters doubled for tied circuits
- Manual devices require 1 hour to switch
- Recloser loop tie points take 1 minute to reconfigure
- Faults are distributed along all parts of the circuit
- The model uses 0.12 sustained faults per year per mile and 0.18 temporary faults per year per mile
- There are 0.04 sustained faults per year per mile per phase and 0.06 temporary faults per year per mile per phase

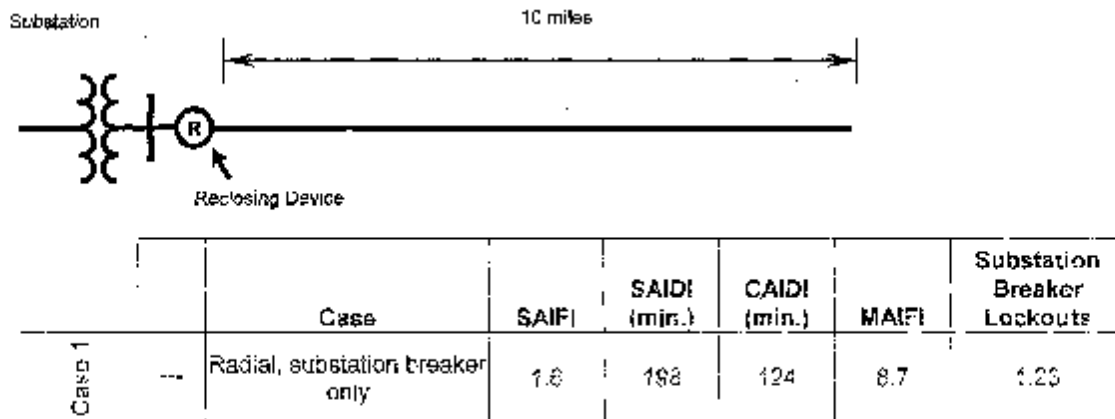
Figure 1 – Typical Distribution Feeder



When quantifying the reliability indices for various configurations, it is important to establish a base case. The base case used in our model is given in figure 2. This

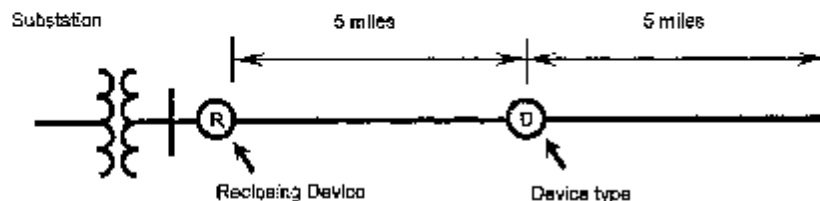
case consists of only one protective device, located at the substation. It assumes that this substation device is either a recloser or a circuit breaker with reclosing capabilities. The reason for this is that it has become un-common to have a substation device without reclosing in the substation for suburban/rural feeders. In each figure, calculated reliability indices for various devices in that arrangement is indicated.

Figure 2 - Substation Breaker or Recloser set to multiple operations (Case 1).



For Case 2, a midpoint device is added to the feeder. Figure 3 identifies all the considered configurations. Note that device type "D" represents several considered devices. This (radial) feeder configuration is most common in rural areas, where tie-points are not typically feasible.

Figure 3 - Addition of Midpoint Devices (Case 2a - 2e).



Where Device type "D" is Case:

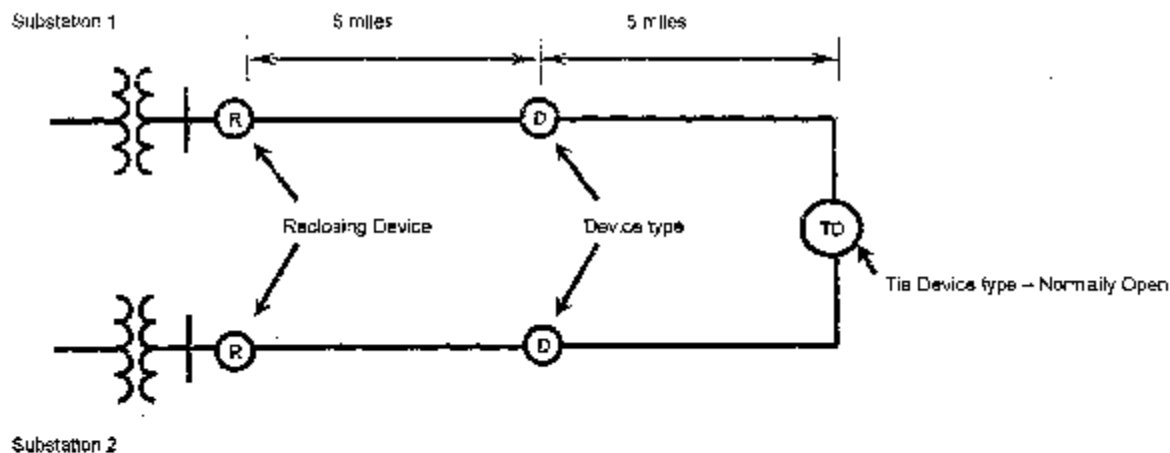
- 2a. Midpoint switch
- 2b. Midpoint sectionaliser
- 2c. Midpoint recloser
- 2d. Midpoint 1 phase switches
- 2e. Midpoint recloser with single phase tripping and lockout



	Case	SAIFI	SAIDI (min.)	CAIDI (min.)	MAIFI	Substation Breaker Lockouts
Case 2	a. Radial, midpoint switch (ganged)	1.6	178	105	8.7	1.23
	b. Radial, midpoint sectionaliser (3 $\phi$ )	1.3	160	124	9.0	0.62
	c. Radial, midpoint recloser	1.3	160	124	6.4	0.62
	d. Radial, midpoint switches (1 $\phi$ )	1.6	170	105	8.7	1.24
	e. Radial, midpoint recloser w/1 $\phi$ reclosing	1.1	139	126	5.0	0.63

For case 3, a tie point device is added to the feeder. Figure 4 identifies all the considered configurations. When considering this type of feeder, all the physical characteristics are doubled, i.e., two times the size feeder considered in Case 1 and 2.

Figure 4 – Addition of Tie Point Devices (Case 3a – 3e).



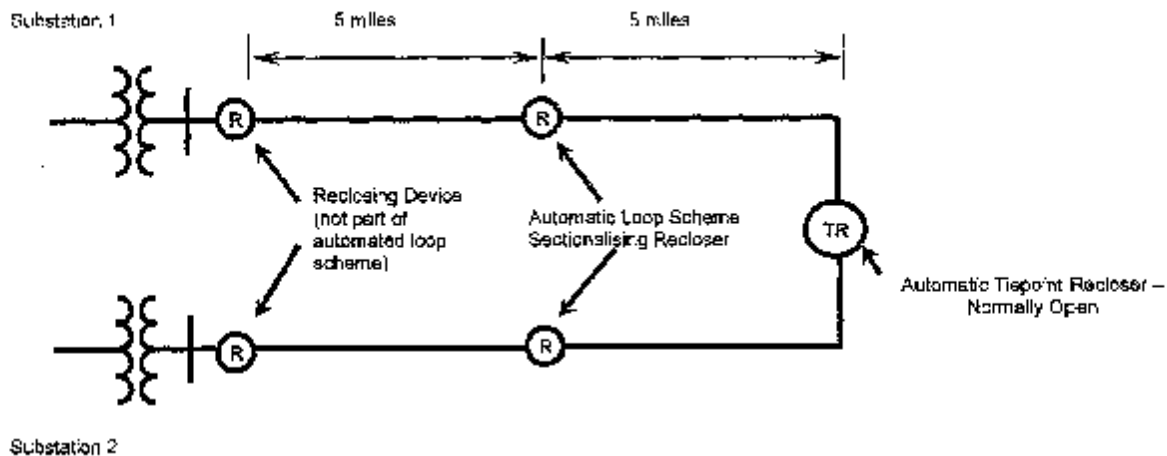
Where Device type "D" is Case:

- 3a. Midpoint switch and tie switch.
- 3b. Midpoint sectionaliser and tie switch.
- 3c. Midpoint recloser and tie switch.
- 3d. Midpoint 1 phase switches and tie switch.
- 3e. Midpoint recloser with single phase tripping and tie switch.

		Case	SAIFI	SAIDI (min.)	CAIDI (min.)	MAIFI	Substation Breaker Lockouts
Case 3	a.	Looped, midpoint switch (ganged), w/ tie switch	1.6	177	111	8.7	1.23
	b.	Looped, midpoint sectionaliser (3 $\phi$ ) w/tie switch	1.3	139	126	9.2	0.63
	c.	Looped, midpoint recloser with tie switch	1.3	140	109	6.4	0.62
	d.	Looped, midpoint switches (1 $\phi$ )	1.6	167	104	8.7	1.25
	e.	Looped, midpoint recloser w/1 $\phi$ reclosing with tie switch	1.1	118	107	5.0	0.63

For Case 4, automated reconfiguration systems using reclosers are considered. The system shown in Figure 5 is the same size as that given in Case 3. The type of system being considered performs reconfiguration based on voltage, and the only devices that include the automated reconfiguration logic are the three devices outside the substation. Four and five unit loop schemes are also used, which yield improved reliability results, though these are not considered in this paper.

Figure 5 – Automatic reconfiguration systems using reclosers (Case 4a & 4b).



Where all reclosers outside substation (3 total) are set up in Case:

4a. Three recloser automatic loop scheme

4b. Three recloser automatic loop scheme with 1 phase tripping

		Case	SAIFI	SAIDI (min.)	CAIDI (min.)	MAIFI	Substation Breaker Lockouts
Case 4	a.	3 Recloser auto restoration	1.0	122	124	6.7	0.82
	b.	3 Recloser auto restoration w/1 $\phi$ reclosing	0.8	99	128	5.3	0.63

## VI. Reliability Summary

What do all the numbers in Table 1 mean? It is difficult to weigh all the parameters in a cost benefit equation. It is instead useful to separate the data into categories which can be correlated to the specific needs of the utility on a feeder level or on a system level. In other words, if a particular feeder is having problems with frequent interruptions, SAIFI could be of greater importance. SAIDI may be of greater importance where continuity of power is high priority (refrigeration, industrial, etc). In any case, it is in the best interest of the utility to analyze feeder circuits which have the most critical loads and have the worst reliability. These feeders will have the greatest impact on improving the overall system and customer satisfaction.

Table 2 indicates the percentage improvements for each of the cases indicated above. The CAIDI index is not included in the comparison due to the fact that the system configuration has relatively little effect on the value. If there is a permanent fault where a line crew is dispatched, it will take approximately the same amount of time to fix it, regardless of the type devices used.

The examples utilizing reclosers are highlighted as reclosers are typically associated with the highest reliability improvement. Though this is generally the case, each Index/variable will be discussed.

**Table 2. Percentage Reliability Improvement Summary and Expected Substation Breaker Lockouts for all Cases (Calculated)**

		Case	SAIFI %IMP	SAIDI %IMP	MAIFI %IMP	Substation Breaker Lockouts
Case 1	—	Radial, substa. bkr only	Base	Base	Base	1.23
Case 2	a.	Radial, midpoint switch (ganged)	None	10	None	1.23
	b.	Radial, midpoint sectionalizer (3φ)	19	19	-3	0.62
	c.	Radial, midpoint recloser	19	19	26	0.62
	d.	Radial, midpoint switches (1φ)	None	14	None	1.24
	e.	Radial, midpoint recloser w/1φ reclosing	31	30	43	0.63
Case 3	a.	Looped, midpoint switch (ganged), w/ tie switch	None	11	None	1.23
	b.	Looped, midpoint sectionalizer (3φ) w/tie switch	19	30	-6	0.63
	c.	Looped, midpoint recloser with tie switch	19	29	26	0.62
	d.	Looped, midpoint switches (1φ)	None	16	None	1.25
	e.	Looped, midpoint recloser w/1φ reclosing with tie switch	31	40	43	0.63
Case 4	c.	3 Recloser auto restoration	38	38	23	0.62
	d.	3 Recloser auto restoration w/1φ reclosing	50	50	39	0.63

The following is a summary of these reliability improvement results.

#### **A. SAIFI Improvement**

Switches yield no improvement in the SAIFI simply because they do not automatically segment the distribution feeder. The application of a sectionalizer or recloser at the midpoint yields a 31% improvement in SAIFI.

The sectionaliser and recloser provide the same reliability since their functionality is effectively the same for midpoint applications.

Adding a tie switch does not have any effect on SAIFI.

Automatic loop restoration improves the SAIFI due to the fact that less customers are included in outages due to the tie restoring segments of the line. In our example case, the significant improvement is seen for customers downline of the sectionalising recloser, when the fault is between the substation and the sectionalising device. The tiepoint is able to restore that segment of feeder within one minute, avoiding a SAIFI event for those customers.

Single-phase reclosing yields an approximate 12% improvement in SAIFI over three phase reclosing and is generally independent of the system configuration, be it radial, looped or automated loop. Single-phase switches, however, do not have any effect.

#### **B. SAIDI Improvement**

SAIDI constitutes the amount of time the average customer is without power over a one year period. The assumption is that a switching operation takes 60 minutes, while an automated recloser operation takes 1 minute. Essentially anything that is placed on the line, whether it is a switch, sectionaliser or recloser will improve SAIDI. As can be seen in Table 2, The effect goes up incrementally from a basic 3 phase switch (10% improvement) to a more sophisticated 3 recloser, single-phase reclosing automated loop scheme (50% improvement). In effect, the decision on which method is best, if SAIDI is the main objective, is a cost/benefit comparison. One notable item is that Case 3, utilizing single-phase reclosing at the midpoint with a basic tie switch (no automatic restoration) actually yields better SAIDI performance than a three-phase automated reclosing system. This suggests that if unless you plan to include single phase reclosing in an automated loop scheme, it may not be worthwhile in terms of SAIDI to incorporate loop schemes.

Single-phase reclosing yields an approximate 11-12% improvement in SAIDI over a comparable system with three phase reclosing.

#### **C. MAIFI Improvement**

Momentary interruptions (any interruption in service) are most effectively reduced by using reclosers. The ability to interrupt faults closer to the location of the fault instead of interrupting the whole feeder provides one of the most dramatic improvements in any of the indices discussed. If the feeder has sensitive loads near the substation (often the case on the typical feeder), it is advantageous to place a recloser beyond that segment, vs. a switch or sectionaliser.

Single-phase reclosing yields an approximate 16% improvement in MAIFI over a comparable system with three phase reclosing. This is due to the fact that for most faults, two-thirds of the customers will see no interruption in service.

#### **D. Breaker Lockouts**

In all of the cases studied, breaker lockouts are directly related to the number of sectionalisers or reclosers placed on the feeder, assuming equal distribution of customers and equal placement of devices. Though not a consideration in this paper, if the substation breaker is a single-phase capable recloser, lockouts on a customer basis can be significantly improved on a feeder. This technique is applied at many utilities today, made possible by the higher interruption capabilities of today's reclosers.

## **VII. Combining Devices on Systems**

It is often the case that systems have more than one of the above type devices on a given system. There are instances where the system has existing equipment of a certain type that is different than new installed type. Some of these cases are covered in the above comparisons, such as the application of sectionaliser midpoints with manual switch tie points (case 3b) or recloser midpoints with switch tie points (case 3c and 3e). From the model, it is shown that the addition of a switch tie point to a feeder with either a sectionaliser or a recloser will yield a 10% SAIDI improvement. However, adding a switch to these type of systems will have no impact on SAIFI and MAIFI.

## **VIII. Conclusions**

The models given in this paper represent a symmetric system, 10 miles long, with evenly distributed taps. In practical application for actual systems, the model can factor in more parameters, such as including portions of the feeder where faults are more frequent (more trees, for example), and can come up with recommendations for the locations of devices which may provide reliability values even better than those outlined in this paper.

All devices discussed in this paper offer an improvement in reliability. Switches will improve SAIDI. Midpoint switches also possess significant value for tie-point applications where feeder ties are possible. Sectionalisers and reclosers perform relatively closely for the various configurations except that reclosers offer more improvement for MAIFI. The highest possible across the board improvement is achieved by using single-phase reclosers and single-phase reclosing loop schemes.

## **Acknowledgement:**

Portions of this paper are from the ABB paper "The Application of Reclosers on Future Distribution Systems" January, 1999.

## **Appendix F**

### **The Market Renewal of Major Automotive Manufacturing Facilities in Traditional Automotive Communities**



# **The Market Renewal of Major Automotive Manufacturing Facilities in Traditional Automotive Communities**

**August 2003**

**Sean P. McAlinden, Ph.D. and Kim Hill, MPP**

**Automotive Communities Program  
Economics and Business Group  
Center for Automotive Research**

## Introduction

The major vehicle producers that manufacture in North America operated no less than 330 manufacturing facilities across the continent producing vehicles, components and parts in 1997 (see Table 1). 232 of the 330 facilities were located in the United States and about 31 in Canada. Independent 1<sup>st</sup> tier component and parts supplier firms owned and operated an additional 4,356 North American manufacturing facilities in 1997 (see Table 2). About 77 percent of these facilities were located in the United States and about 11 percent in Canada (see Table 2). The vehicle firm facility number of 330 has declined marginally somewhat since 1997 especially if we still include plants operated by major "spin-off" parts firms such as Delphi, Visteon, or American Axle.<sup>13</sup>

**Table 1: Manufacturing Facilities 1997**

	Assembly	Powertrain	Stamping	Parts	Total
N. America	90	43	38	159	330
U.S.	65	30	33	104	232
Canada	13	5	3	10	31
Mexico	12	8	2	45	67

Source: The Harbour Report North America 1998, Harbour and Associates, Troy, Michigan, 1998

<sup>13</sup> McAlinden, S.P.; Smith, B.S.; Cole, D.E., Future Direction of the Great Lakes Automotive Industry. 1999. The Great Lakes Commission, Ann Arbor

**Table 2: Component and Parts Supplier Locations 1997**

	Facilities	North American Share
Great Lakes	2,584	59.3%
U.S.	3,366	77.3%
Canada	459	10.5%
Mexico	531	12.2%
N. America	4,356	100.0%

Source: 1998 ELM Electronic Database

The closure of major traditional facilities since the mid-1990's has been almost exactly offset by the opening of new plants operated by the major international producers as well as a handful of new "Big Three" plants. Vehicle firm facilities are still the most attractive economic development targets in manufacturing. It is also true that given the intense competitive pressure of the current North American light vehicle market, almost all of these plants must be renewed with new product manufacturing investment in the next five years. Finally, given the undeniable existence of considerable overcapacity in the North American auto industry – it must be assumed that not all of these plants will be renewed – and that competition between states and communities for renewal investment will be as strong as or stronger than that in any period during the last thirty years.

#### *The Value of Major Auto Production*

Many studies of the economic value of traditional automotive production and employment to communities, states and provinces, and national economies have been published in recent years. Research by the Center for Automotive Research (CAR) performed for the Alliance of Automobile Manufacturers (AAM) in 2000 has shown that each job at a major automotive firm contributes about 6.5 other jobs throughout the rest of the U.S. economy.<sup>14</sup> About half of these jobs are located in the manufacturing and non-manufacturing supplier sectors connected to the industry. Another recent study performed by CAR with the Institute of Labor and Industrial Relations at the University of Michigan in 2002,<sup>15</sup> showed that each job created or lost at a powertrain (engine or

<sup>14</sup> McAlinden, Sean P. and George A. Fulton, *Contribution of the Automotive Industry to the U.S. Economy in 1998: The Nation and Its Fifty States. A Study Prepared for the Alliance of Automobile Manufacturers, Inc. and the Association of International Automobile Manufacturers, Inc. by the Center for Automotive Research, Environmental Research Institute of Michigan and the Institute of Labor and Industrial Relations, The University of Michigan, Ann Arbor, March 2001.* And also see McAlinden, S. P.; Fulton, G.; and Smith, B.C. *The Contribution of the International Auto Sector to the US Economy. A Study prepared for the Association of International Automobile Manufacturers, University of Michigan Transportation Research Institute, Office for the Study of Automotive Transportation and The Institute of Labor and Industrial Relations at the University of Michigan, Ann Arbor, MI, March 1998, Report No. UMTRI-98-5.*

<sup>15</sup> McAlinden, Sean P. and George A. Fulton, *Economic Impact of the Elimination of the Michigan Motor Vehicle Powertrain Industry on the Michigan Economy: A Report to the Michigan Economic Development Corporation.*

transmission) facility in Michigan increased or decreased employment by an additional 4.5 jobs throughout the rest of a traditional automotive state economy like Michigan. About 40 percent of these additional supplier and spin-off jobs were located in manufacturing, and the rest in sectors that include wholesale trade, trucking, finance, and retail and services trade.

The essential value of renewing a major automotive facility, of course, is connected to the employment, investment, and wage and salary levels directly associated with such plants. Currently, the production worker and skilled trades wage rates paid by vehicle firm (and major spin-off) firms are 69 percent higher than the average U.S. manufacturing wage rate. Benefits paid to employees are higher than those given in other industries by an even larger margin. Also, the international vehicle firms have exactly matched these compensation levels wherever they located throughout the United States. Company investment in these facilities is also at the highest level in the U.S. economy – over \$330,000 per job. The gain to communities and states in income, sales and property and real taxes is realistically enormous, even when such taxes are significantly abated for the purpose of renewal.

#### *A Report on Policy*

This report to the Automotive Communities Program (ACP) membership will entirely concentrate on the renewal and replacement of major, traditional automotive facilities and not those located in the independent supplier sector or facilities operated by the international vehicle firms. Those two subjects will be left to future CAR reports for the ACP. In other words, this report will concentrate on facilities owned by the "Big Three" vehicle firms and their major spin-off supplier firms. Also, this report will not closely examine two of the three major categories of factors involved in facility renewal: the internal economics of the facility and its location, and the constraints placed on the company by its national labor agreement. Instead, we will relay from the firms themselves a list of important elements of state and local community policy that frequently play a final role in the decision to re-invest in a facility. The brutal reality always exists that state and local policies can rarely affect the local business climate of a region, or its geographic location – and public policies can certainly not change the rules of a national labor agreement. However, it is the role of policy and local economic development to sometimes off-set the unfavorable parameters and emphasize the positive factors associated with a location and a region.

#### **The Economics of Facility Renewal**

The essential activity for major auto firms in ranking or picking plants for investment or closure is an exercise in cost minimization subject to constraints. All of the major automotive firms employ a standard decision matrix for collecting and analyzing information about locations – but all admit that this matrix and the decision-making

process itself is not mechanical by any means. In fact, the variety of products that must be produced actually forbids the use of a standard model and almost every selection process is largely unique. For example, a decision on a gray iron foundry plant may require access to abundant water, low expected utility rates and minimal investment, discounted over a 20 year time horizon. Two competing locations could be almost equivalent on these "show-stopper" factors, and the decision finally made on less critical factors such as marginal freight costs, relative labor settlement costs, or access to state subsidized training or refundable tax credits. Decisions on different facilities such as a new assembly body shop or the assembly line for heating and air-conditioning components may involve a completely different list of criteria. Policymakers must be thoroughly knowledgeable regarding these plant specific technical criteria in order to gauge their policy strategies for renewal.

Previous research by CAR<sup>18</sup> has shown that the standard list of economic decision factors can be divided into one time costs or features, and recurring costs. The list is long, but the major one-time criteria include the following:

1. Availability of capacity: Will new capacity become or is it available at the existing facility or site?
2. What are the equipment requirements at the site in order to achieve the new production?
3. Is the facility large enough – are the physical characteristics of the facility suitable?
4. Are local prices for construction competitive?
5. If new land is needed – is it available – with clean title, and is it cost competitive?
6. What are the costs of a labor settlement (see below)?
7. How long will the investment process take to result in full production?

The last factor above, timing, has reached a new all-time critical importance in light of the recent pace of automotive competition and the increasing cost of product development.

The criteria listed above, of course, determine the essential size of the company's investment at the site. Recurring costs, however, may be even more important than the size of many initial investments. A classic list – which does not include public policy variables affecting the business environment – follows below:

1. The cost of freight in – or how far away are suppliers? What are local freight rates?
2. The cost of freight out – or how far away are customers? What are local rates?
3. Related to the two factors above: The constraints of local transportation and congestion.

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<sup>18</sup> See the discussion in McAlinden, S.P.; Andrea, D. J. Michigan: Still the Automotive State? A Report to the Michigan State Department of Commerce, Office for the Study of Automotive Transportation, Transportation Research Institute, University of Michigan, March, 1993, Report No. UMTRI-92-42.

4. Utility rates for electric, gas, water and sewage.
5. Labor availability, quality, skills, and reputation. Health care costs.
6. Insurance and security costs.

Most recurring private sector costs fall into the three areas of freight, labor and utility costs. Almost all other recurring costs fall into the public sector and, indeed, some of the market factors listed above can be affected by public investment. The labor issue for traditional auto producers is rarely discussed (not surprisingly), yet is absolutely critical and in several different ways. Indeed, missing from the recurring cost list of factors above is the direct cost of labor or wage rates and benefits – a major factor in supplier facility location, but not for large traditional plants.

### **Labor Constraints and Costs**

A major set of constraints on the open selection of facilities or locations for new investment by traditional automotive firms is contained in their national agreement with the International United Autoworkers Union (UAW). It is also thought that this set of constraints gives the international producers, not subject to the union provisions, a major competitive advantage in manufacturing costs. This is somewhat untrue. The internationals have strong, systematic requirements regarding the quality of labor, the absence of other industrial competition in the local labor market, and access to quality training and educational facilities. The internationals also pay the same wage rate, and essentially the same benefits, as traditional unionized firms. These requirements are harsh and constraining, because the internationals know they can never shut a plant and leave a location without seriously damaging both their reputations as employers and their production systems. Labor constraints associated with the UAW fall naturally into two categories – those arising from the national agreement, and those in the local agreement.

#### *The National Agreement*

The pattern national agreement applies more or less equally to 312,000 General Motors, Ford, Chrysler Group of DCX, Delphi and Visteon UAW employees. American Axle and several other spin-off companies are also committed to the same pattern agreement. The agreement contains a number of income maintenance benefits and worker displacement provisions that can directly determine much of the cost of company disinvestment in a facility. The UAW expressly negotiated these provisions, it is thought, to actually prevent the closing of plants (forcing their renewal) and, indeed, did negotiate a plant closing moratorium of remarkable effectiveness (compared to those previously negotiated) in the 1999 pattern agreement. No Big Three plants have closed since September 1999, except several plants previously announced to close in earlier national negotiations. However, this pattern is clearly under pressure from all three major employers in the current negotiation where large shutdowns are typically negotiated as "exclusions" to the plant closing moratorium agreement.

The UAW protects its members (and indirectly some of their facilities) through its income maintenance provisions in the contract that apply in the event of layoff. Workers on layoff are eligible for Supplementary Unemployment Benefits (SUB) at a rate of 95 percent of normal take-home-pay for forty two weeks in the event of layoff. If the layoff is not purely a sales or market related layoff, the worker must be brought back into protected status after 42 weeks at 100 percent of their gross pay plus full benefits and seniority privileges. Many billions of dollars have been explicitly guaranteed in the contract to back these two income maintenance funds. No pattern automotive firm can afford to exhaust these funds through layoffs (thus much of the rationale behind the incentive programs for car sales).

If a pattern company closes a plant, laid off workers must accept another job within a fifty mile radius (sometimes up to 100 miles) local area hiring area. Otherwise, workers can refuse job openings at distant plants and continue to receive the income maintenance benefits described above. If a worker does accept a long distance transfer, the contract and other special local provisions can result in a relocation allowance of up to \$62,000 over two years. Also, workers that have experienced a plant shutdown that involves the movement of their product to another plant – can move with full local seniority rights to the new plant and bump an existing worker into layoff (Paragraph 96). Finally, the UAW also reserves hiring at new facilities or new hiring generally for their existing layoffs by seniority<sup>17</sup>.

The impact on facilities of the local area hiring rules of the job and income security provisions in the UAW pattern agreement has been largely negative for regions that contain a large number of UAW facilities. Laid off workers from a plant shutdown in Michigan, and the Northern Regions of Indiana and Ohio can frequently be forced to accept a job opening (due to attrition) at a nearby facility almost immediately and without cost to the company. Isolated and distant plant locations raise the specter of enormous labor settlement costs (amounting to hundreds of millions of dollars) in the case of non-renewal. The most traditional of automotive communities with many company plants, then, have suffered the largest share of closures for this very reason.

Communities, however, that rely solely on the layoff provisions of the national agreement as their only security for re-investment are running a serious current risk. Companies have become very adept at buying out workers for the purposes of early retirement or transfer, and a number of remaining Northeast and coastal locations now demonstrate and have demonstrated so many other serious location costs that companies will soon pay the high settlement cost to close them.

### *Local Labor Constraints*

Each traditional automotive facility operates its labor relations according to a local labor agreement negotiated by plant management with officials of the local labor union in the plant. The agreement sets employment levels, the number of job classifications, and

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<sup>17</sup> See for example, Appendix A. Agreement Between General Motors Corporation and the UAW, September 28, 1999.

various other local working conditions not covered by the national agreement. Direct representation of workers on the job, especially through the grievance process, is the responsibility of the local union. In other words, actual labor productivity is really determined under provisions of the local, not the national, agreement.

It is now an accepted fact that all traditional automotive firms require, or will soon require, a "modern operating agreement" from the local union as part of any renewal or re-investment plan. These agreements are more notoriously called "living or shelf" agreements which go a long way towards guaranteed productivity conditions in the plant similar to the best of the international vehicle firms. Such contracts typically require a team concept organization of work, very lean staffing requirements, and a severe reduction of skilled trades classifications in the labor force (perhaps only three trades). The agreements also allow a great deal of flexibility in reassigning workers to work throughout the plant, and perhaps the outsourcing of subassembly and construction work to outside suppliers.

Other local labor indicators that play a role in plant renewal include the general state of labor relations, strike behavior, grievance rates, and absenteeism rates of a labor force. Finally, the age and seniority demographics of a given facility may now play an active role in renewal. Plants with older labor forces are cheaper to close than those lucky enough in the recent past to replace many of their retiring workers with new hires.

In summary — labor constraints are a powerful factor in traditional automotive facility renewal. Three of the four firms whose interview responses we discuss below, ascribed a "total power to veto" to the directors of their industrial relations departments of their firms. This veto power can even reverse decisions made by executives as high in status as the CEO or the VP of manufacturing.

### **The Role of State and Community Policy and Relations**

The domestic automobile industry has shut down over 100 major facilities operated in the United States, since 1979. Still operating are approximately 130 plants plus 58 new greenfield plants that survived, presumably, because of their efficiency or strategic value to the parent companies. (see Appendix A) In other words, the less competitive plants/locations have already been closed. Thus, the surviving plants, when compared against each other, are somewhat similar in efficiency, which makes it difficult for the companies to decide where to place new capital expenditures. For this reason, state and local incentives have taken on heightened importance.

It seems that the policy environment for facility renewal begins where the private sector variables leave off. On the other hand, some of the private sector economic variables such as the cost of land or even the utility rate structure can be modified by direct state policy intervention. Other business climate variables such as corporate income taxes, the cost of workman's compensation and unemployment insurance benefits are also direct state policy variables. Also, the strength of a local and state incentive package may prove to be the final determining factor in selection of a facility and its community—



all other factors being equal. Of greatest interest to the ACP, however, is the joint role of the state and the community in formulating and laying the public groundwork for a deal that brings about re-investment or even investment in a brand new facility.

CAR interviewed four major automotive firms primarily for this section of the report: **General Motors, Ford Motor Company, DaimlerChrysler, and Delphi.** Typically, the Director of State and Local Relations from the corporate policy division responded to a prepared list of questions. In several cases, a representative from the real estate or land division also participated significantly in the interview. However, we will not identify the authorship of any of the responses we report below, nor will we identify any of the communities or facilities that may have been used as examples to make certain points in the discussion by our respondents. The questionnaire is attached to this report (see Appendix B).

### *Who Makes the Decision?*

Several of the firms described the actual final meeting regarding the placement of a large new manufacturing investment. The final decision is made in a meeting of a small number of senior executives (always vice presidents) at the division or corporate level. Each participating function including manufacturing, operations, utility cost management, facilities management, labor relations, real estate, legal staff, and policy have already submitted their reports to these company officers who must make the final balancing decision between two or three final alternative locations. They commonly do this alone in a separate room, although other parties may be asked to enter and provide additional information. The senior divisional manager, the VP of Manufacturing, and perhaps the facilities VP seem to constitute a typical final decision group. It seems apparent that it is only the policy staff who may be asked to seek additional "sweeteners" or information to swing the decision one direction or another in the case of a close tie.

### **Interview results**

The corporate staff members interviewed for this report were asked to respond to a series of written questions on the factors that play a primary role in the renewal of automotive facilities. We collect these responses under the four major categories below. Responses were sometimes received in writing and always through a personal interview. These executives and managers were asked to especially comment on community factors balanced against other economic determinants. What follows is a summary of these interviews followed by general conclusions and recommendations.

1. *What are the three main factors your company considers internally in the site selection process? (Before the consideration of specific communities)*

All four companies and most of the respondents demonstrated a remarkable consensus on at least two of the three main internal factors in the site selection process. **Logistics**

or the cost of transporting freight in and completed product out of the facility was strongly emphasized by each firm as a main factor in selection. Freight is regarded as especially costly, and though it was sometimes referred to as "an underlying cost," it was also clearly connected to other local transportation costs such as the state of transportation modes or infrastructure and the presence of congestion (a real deal-killer).

All four companies strongly mention the **workforce** as a second main factor. Under the contract, union workers must be available at the facility or through sufficient transfers of such workers from other locations. The quality and training of the labor force must be adequate, as must be the state of local labor relations. A "partnership must exist with the local union for the purpose of securing the next generation of new products in an era of severe over-capacity." One firm stated that "every plant is expendable for new investment and the partnership must be there – the labor relations must be set." Clearly these statements refer to necessity of achieving a modern operating agreement (described above) with the local union leadership and labor force, that provides required flexibility and productivity levels.

Leading the list of the remaining, non-community factors in site selection is "the state of the relationship with state government." The state's policy and regulatory climate must be competitive on such issues as tax rates, the regulatory environment and, of course, state incentives. In fact, all four responding firms made a clear point of stating the "incentives have never been more important," or "critical (see below)." This clearly refers to the severe competitive state of the North American market that now suffers from record vehicle incentive levels and massive, formal cost-cutting programs at each producer.

State programs, especially tax programs, are very difficult to compare. New York, it was pointed out, "doesn't even tax personal property." The process for setting rules across states, then, is very difficult for corporate decision-makers. It should be pointed out that states with regulatory environments that are burdensome, costly and inflexible such as Massachusetts, Eastern New York, and California (and soon, New Jersey) now contain exactly one automotive plant (NUMMI). The **timely launch** of products, specifically the "construction timetables," is now **the most competitive factor** in the North American auto industry. In fact, one vehicle firm admitted to filing permit applications in a least three states for each project in order to ensure the timely start of a project.

Other non-community factors that were given heavy attention in some of the interviews included utility rates and services, and a variety of factors, such as construction building and leasing costs, under the heading of **site readiness and infrastructure**. This last factor covers the issue of capacity, both in terms of land and the facility. Infrastructure should "already exist" and further land acquisition should not be an issue. Permits should be "available" and existing environmental issues should not be present at the site (we want "fresh, clean dirt"). One vehicle firm stated that a site must be "buildable," and another said that "if we can't build it right, why build it?"

2. *What are the three main community factors in choosing a site?*

The subject of community factors in site selection proved to be the liveliest in the interviews, perhaps because the majority of respondents were most familiar with these issues in the normal course of their work. An initial factor is the **quality of life** associated with a particular community. One respondent simply states that the factors were safety (crime), education, and other quality of life amenities. In fact, quality of life, when compared to other issues that surfaced in the other interviews discussed below, did not clearly stand above the other factors that were discussed.

The overwhelming community specific factors that surfaced in our interviews were the overall **attitude** of the community towards the company and the proposed re-investment, and the presence in the process of a clearly identifiable **decision-maker** with sufficient power to make the deal happen. To a certain extent, the pre-existing reputation of a community stands for its attitude. A poor reputation for being a difficult community was described as "very difficult to shake." One community south of Detroit recently elected a mayor that described the economic package given to an assembly plant as "giving the store away," which caused months of significant political problems for the corporation. Years may pass before the company may grant forgiveness to the community. Another company succinctly divided its communities into three types:

1. "Those that act together as one entity. They have the energy to get the deal completed. They know what is going on at their plant, and they know what is going on in the industry.
2. Communities that have the energy to get the deal done, but have no idea what's going on at their plant or in the industry.
3. Communities (that flat out) don't care (The entire Northeast)."

Needless to say, the third type of community described above rarely has its plant renewed (e.g., GM Framingham, MA, or GM Tareytown and Syracuse, NY). Instead, a "can do attitude" or "approach" is recommended. And a complex decision process for approval that "drags a process on-and-on" is certainly not recommended. Some companies apparently early on, apply a "smell test" on the willingness of a community to do a deal, partially based on past performance. Too many meetings with high-level corporate officers (always very expensive) is a poor indicator, always, of community willingness to do what is necessary to keep a plant.

In particular, a community must demonstrate that it wants to keep a plant and a company. The community must want to partner as much as the local union. The political/community climate must be favorable – "you don't want to go where you aren't wanted." A neighborhood that has gentrified and doesn't care for the supposed "smell" of its automotive plant is a community that doesn't want an automotive plant.

Community relations can become very important to a company, especially since the state incentive package very often depends on community support.

The importance of community support underlines the importance of a **friendly, meaningful, and committed community leadership**. One vehicle firm admits that in negotiation, they try to pick "where the center of power is," but there are "different levels of power." Another vehicle firm eloquently described the power and effectiveness of a **regional champion** – or political figures that their executives recognize who are fully cognizant of industry issues and requirements and who can make it happen. Yet another vehicle firm described such an individual as an "**empowered deal-maker**," or "a single voice who can speak for the community's leadership, for 'the community must speak with one voice.' Mayors such as those in Lansing and Toledo were such individuals.

### **Incentive Packages**

#### *3. Does the company value incentives based on their direct effect on the bottom line?*

Respondents were adamant about the importance of effective incentives: "every dollar helps." One respondent directly said that "we look at the incentive's ability to contribute to making the financial business case for an investment at the particular site." Another said that that "packages must go to the bloodstream – the bottom line – where the most benefit to the company is. What will reduce the price of manufacturing an engine?" Of course the incentive environment is largely determined by the state. And clearly, not all incentives are equal in the eyes of the corporation. All-in-all, however, the value of the total package is what matters – especially to the divisional, project staff assigned to net the entire deal.

An important issue is the relative value of various incentives. All of the companies denigrated the value of non-refundable tax incentives that may provide the company, in the end, with virtually nothing. Some company investments, for example, may last for only four or five years (body shops at assembly plants). A twenty-year tax abatement on new personal property investment, then, is only useful for the first five or six years or so. This may or may not reveal the relative industry ignorance of the tax authorities regarding the current speed of the industry product cycle. Another major issue is the value of tax incentives that are directed towards job retention versus new job creation. The Michigan MEGA and Super-MEGA programs are held up by all four firms as model of job retention since only the presence of likely alternatives triggers qualification. Also, super-MEGA now carries an upper limit of \$250 million in payroll taxes and is highly valued by at least three of the four firms.

Property tax abatements are currently less valued in final site decisions because it is felt that such subsidies will be matched across all the alternative sites – and some states do not even carry such taxes. However, the passage of "Proposal A" in Michigan in the

early 1990s was considered epochal for deals done in that state since it removed local school districts from the picture (their funding now guaranteed directly from the state). This made the process of abating property taxes much easier. "Clawback" provisions in public deals, or provisions that mandate the payback of tax breaks if promised new employment doesn't appear or employment levels aren't maintained can result in a severe discounting of the value of tax incentives with this provision. Finally, southern states were described by three of the companies as entirely oriented to new job creation and as providing little in the way of job retention incentives. These companies are primarily interested in incentives for job retention perhaps due to labor contract requirements.

Only one firm rates subsidies that provide new public infrastructure as important in a deal. The other firms clearly felt the infrastructure should already exist or such subsidies merely make up for glaring deficiencies. Communities should already maintain a portfolio of prepared sites with road, rail access, and cheap, reliable power, sewage and water at the property line. Communities, of course, must participate in development of state incentives that do matter or they won't happen. Very often, the ground-work for a deal with the community is performed by the policy staff of the company before the state becomes involved.

#### *4. What can communities do to attract automotive investment?*

One responding firm simply states that a community should simply demonstrate good-behavior and a business-friendly attitude. Coalitions of all of the stakeholders (schools and political groups) are impressive when such broad-based groups express their desire to maintain the company in the community. Another vehicle firm was far more specific on the issues of political leadership and community attitudes. This company felt that many communities were trying to compete but were stuck with leaders that lacked the ability to do so. A necessary but not sufficient requirement, was the presence of **real economic development expertise** – usually placed in the staff of a "big-league" growth alliance of communities across a region. Leadership must understand "the big picture of the global business, and to be able to effectively communicate this reality to the community." There should also be one voice for the community, or even better, the entire region.

It was also interesting to note that three of the companies recommend that individual communities not be pro-active in contacting the higher echelons of the company – they should instead work normally through the local plant manager who now must cover economic development as part of his/her mission. Surprisingly, two of the firms thought a large number of traditional communities were still "naive" regarding the continued presence of the company in their area. The company is thought to be a fixed part of the economy and that it "has" to or "always will be there." This was thought to be clearly a demonstration of poor leadership and communication, and/or a lack of industry knowledge.

The firms interviewed were mixed in their responses to building on brownfield sites—due mainly to their technical cultures. In any case, the site should be buildable with all mitigation issues already resolved.

### **Recommendations and Conclusions**

Recommendations to communities are difficult to make because of the diversity of these public entities and the variety of company investments that confront the upper mid-west.

1. It is strongly recommended that every traditional automotive community solidly connect to a representative **regional champion** - a politician that can make solid offers to major automotive firms, understands thoroughly industry issues and deliver without question on bottom-line promises. A regional champion forges partnerships across community stakeholders and delivers this consensus to company managers as a solid asset. Such an individual leader is indeed rare, and this requirement can be largely unfair, especially for smaller communities – but it is necessary.
2. States outside of Michigan should provide tax incentives similar to the model provided by the MEGA program in Michigan, or refundable credits that emphasize job retention.
3. States and communities should also make available incentives that lower the actual cost of operation of the plant in their community; and they should **eliminate claw-backs** from their tax incentives; and concentrate on **refundable tax credits** that exactly match the market-life of company investments.
4. Community and state representatives must thoroughly understand industry issues and solid technical expertise in economic development must be available at least in multi-community growth alliances. Some community representative(s) must become familiar with facility personnel and its business situation through frequent contact.
5. Communities and states must demonstrate that the company and its facility is wanted, long-term, in the community. Negative feedback or displays, or even general lack of concern are to be avoided at all costs. In other words, the community is a supplier, not a landlord, and must act like any other competitive automotive supplier who wishes to do business in the North American auto industry.

## Appendix A

**Table A.1**  
**Vehicle Firm Facilities in the United States: 1979 - 1995**

	Total					% of 1995 Total	Total					% of 1979 Total
	1995						1979					
	Assembly	Powertrain	Stamping	Parts	Facilities		Assembly	Powertrain	Stamping	Parts	Facilities	
U.S. Totals	63	30	24	104	221	100%	72	25	37	124	258	100%
Southeast	3	0	0	9	12	5%	5	0	0	7	12	5%
Southwest	4	0	0	8	10	5%	2	0	0	5	7	3%
Northeast	6	2	2	9	19	9%	11	1	2	16	30	12%
Midwest	35	25	22	74	156	71%	34	24	35	93	166	72%
Midsouth	13	3	0	1	17	8%	13	0	0	1	14	5%
West	2	0	0	3	5	2%	7	0	0	2	9	3%

**Table A.2**  
**Vehicle Firm Facility Openings and Closings in the United States**

	Assembly			Powertrain			Stamping			Parts			Total		
	Open	Close	Net	Open	Close	Net	Open	Close	Net	Open	Close	Net	Open	Close	Net
U.S. Totals	23	32	-9	12	7	5	0	13	-13	23	43	-20	58	95	-37
Southeast	0	2	-2	0	0	0	0	0	0	4	2	2	4	4	0
Southwest	2	0	2	0	0	0	0	0	0	2	1	1	4	1	3
Northeast	1	6	-5	1	0	1	0	0	0	0	7	-7	2	13	-11
Midwest	12	11	1	8	7	1	0	13	-13	14	33	-19	34	64	-30
Midsouth	6	6	0	3	0	3	0	0	0	0	0	0	9	6	3
West	2	7	-5	0	0	0	0	0	0	1	0	1	3	7	-4

Source: Motor Vehicle Manufacturers Association of the United States, Association of International Automotive Manufacturers.

### Vehicle Producer Facility Regions

Region	States:
Southeast	Alabama, Georgia, Mississippi, Virginia
Southwest	Kansas, Louisiana, Oklahoma, Texas
Northeast	Connecticut, Delaware, Massachusetts, Maryland, New Jersey, New York, Pennsylvania
Midwest (Great Lakes)	Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, Wisconsin
Midsouth	Kentucky, Missouri, Tennessee
West	California

## Appendix B

### Market Renewal Interview Questionnaire

1. What are the 3 main factors *[company name]* considers internally in the site selection process? (This is before looking at any communities)
2. What are the typical phases of a site selection process and who (title at *[company name]*) is involved in each phase?
3. What are the 3 main community factors in choosing a site?
4. How important are the following:
  - a. Local tax rates?
  - b. Regulatory environment? (e.g. environmental permits)
  - c. Political climate?
5. Does *[company name]* value incentives differently based on their direct effect on the bottom line?
  - a. How do you value incentives that benefit both the company and community, such as infrastructure improvements?
6. Thinking about incentive packages, what makes them attractive?
  - a. Total package amount? or,
  - b. Specific items in the package? What are examples of these?
7. How does *[company name]* choose between communities with two very similar incentive packages?
8. Does *[company name]* have an operating cost calculating tool that can be used to compare the costs of running a plant in various communities? If not, how do you compare these costs between communities?
9. Are incentive packages really the deal-breaker, or do they just get the communities to the table, with something else clinching the deal?
10. What can/should communities do to attract automakers?
11. Are there distinct regional differences in sites and incentive packages that communities offer? (e.g. Midwest versus Southern sites)
12. What about brownfield redevelopment versus greenfield development? Is one type preferred over the other?
13. Is there anything else we haven't asked, but we should know, about the site selection process?



## **Appendix G**

### **Various letters of concern from large users**

- Email dated February 8, 2005 – Mr. Bryan Sellan, Daimler Chrysler
- Email dated January 31, 2005 – Mr. Gordon Hawk, Ford Motor Company
- Letter dated February 24, 2003 – Mr. Robert Simpson, Kautex Textron
- Letter dated July 15, 2004 – Mr. John Bogdanovic, Windsor Mold
- Email dated February 1, 2005 – Listing of customer power quality complaints

**Tom A Kosnik**  
01/31/2005 02:42 PM

To: Shawn C Filice/EWP/Windsor@WINDSOR  
cc:  
Subject: RE: Information Required - EnWin Powerlines

FYI

Tom Kosnik M.A.Sc., P.Eng.  
President  
EnWin Powerlines  
519-251-7304

tkosnik@enwinpowerlines.com

----- Forwarded by Tom A Kosnik/EWP/Windsor on 2005-01-31 02:42 PM -----



"Hauk, Gordon (G.D.)"  
<ghauk@ford.com>

2005-01-31 10:37 AM

To: <tkosnik@enwinpowerlines.com>  
cc:  
Subject: RE: Information Required - EnWin Powerlines

We don't have anything that formal. When a new project is anticipated a note is sent out requesting projected rates and if capacity is in place. My response to that note includes a history of service (outages). Based on all the input management makes a siting decision.

-----Original Message-----

**From:** tkosnik@enwinpowerlines.com [mailto:tkosnik@enwinpowerlines.com]

**Sent:** Friday, January 28, 2005 8:54 AM

**To:** Hauk, Gordon (G.D.)

**Subject:** RE: Information Required - EnWin Powerlines

Does Ford use a spread sheet that would highlight how much weighting it puts on power quality at a site that is being evaluated or based on the information below it is a go or no go to the next step in site evaluation?

Tom Kosnik M.A.Sc., P.Eng.  
President  
EnWin Powerlines  
519-251-7304

tkosnik@enwinpowerlines.com

"Hauk, Gordon (G.D.)" <ghauk@ford.com>

2005-01-28 08:47 AM

To: <tkosnik@enwinpowerlines.com>

cc:

Subject: RE: Information Required - EnWin Powerlines

It will take some time to pull together data but here is the bottom line. Quality of supply has to come first, we can not expand in an area where power is not reliable regardless of price of electricity. What proof do I have on this? I can only point to the amount of investment we have made in two line feed to the plants and discussions we have with every utility before we decide on a location. What is reliable? We have set an internal

target of one outage every two years if we see more than that we need to have discussions with the utility to see if there is any commonality in the outages, is there anything that needs attention. The one outage in two years has some science behind it, according to EPRI that is the number of expected outages on a 5 mile long high voltage transmission line.

I have to think about what documentation to send, I could send some historical information on outage reductions or the amount of investment in the service Ford and the utilities serving us have made in recent years. If you have any ideas let me know.

-----Original Message-----

**From:** tkosnik@enwinpowerlines.com [mailto:tkosnik@enwinpowerlines.com]

**Sent:** Friday, January 28, 2005 8:13 AM

**To:** Hauk, Gordon (G.D.)

**Subject:** Information Required - EnWin Powerlines

Good morning Gord, I hope everything is going well!

We have been working on a report to the Board of Directors on Distribution System reliability. One of the arguments that must be addressed is how much weighting does Ford( or any other manufacturer ) put on the issue of power quality in the decision making process when 1) maintaining and expanding the existing operation, and 2) when deciding on the location of a new plant. What are there basic minimum outage requirements for a plant to remain operational in the Ford family. I realize depending on the product line and the type of plant ( assembly or feeder) will have an effect on the requirements.

Gord, any documented information on this subject would be greatly appreciated and may go a long way in the future to insure that the City of Windsor remains competitive in attracting and maintaining a vibrant auto industry now and in the future. I have a tight time line on this report and I would appreciate the information asap. Thanks in advance.

Tom Kosnik M.A.Sc., P.Eng.

President

EnWin Powerlines

519-251-7304

tkosnik@enwinpowerlines.com

Tom A Kosnik  
02/08/2005 01:32 PM

To: Shawn C Filice/EWP/Windsor@WINDSOR  
cc:  
Subject: Re: Fw: Information Required: EnWin

Please include in your report  
Tom Kosnik MASc., P.Eng.  
President  
EnWin Powerlines  
519-251-7304  
tkosnik@enwinpowerlines.com

----- Forwarded by Tom A Kosnik/EWP/Windsor on 2005-02-08 01:32 PM -----



bs17@daimlerchrysler.  
com  
2005-02-08 08:29 AM

To: jlm1@daimlerchrysler.com, tkosnik@enwinpowerlines.com  
cc:  
Subject: Re: Fw: Information Required: EnWin

In response to this there is no set requirements on paper. DaimlerChrysler requests an occurrence or power quality report for electrical service to a potential site. They use this information to determine what type of power interruption ride through equipment would be necessary for the proposed plant. The cost of this equipment is considered in location of the plant along with the many other considerations. Assembly plants and machining plants are more sensitive to power quality than a stamping plant would be. There is no formal process or standard in place at DCX for this review.

The Building Group requests the same power quality report on the electrical supply for a site for building design purposes. This is usually after the site has been selected. It does not appear that they participate formally in the site selection process.

I hope this is helpful.

Bryan Sellan  
Facility Engineering

Lucille M Laviolette/WGOB/DCC/DCX

01/31/2005 10:33 AM

To: Bryan Sellan/WGOB/DCC/DCX@wk-America  
cc: john@themanns.ca  
Subject: Fw: Information Required: EnWin

Bryan,

John will be out of the office all week. I'm not sure if you should see this in his absence.

Lucille

----- Forwarded by Lucille M Laviolette/WGOB/DCC/DCX on 01/31/2005 10:32 AM -----

Lucille M Laviolette/WGOB/DCC/DCX

01/28/2005 10:41 AM

To: john@themar.ns.ca

cc

Subject: Fw: Information Required: EnWIn

John,

Please see the following. Shall I forward to Bryan Salan?

Lucille

----- Forwarded by Lucille M Laviolette/WGOB/DCC/DCX on 01/28/2005 10:40 AM -----

tkosnik@enwinpowerlines.com

01/28/2005 08:39 AM

To: jlm1@daimlerchrysler.com

cc

Subject: Information Required: EnWIn

Good morning John, I hope everything is going well!

We have been working on a report to the Board of Directors on Distribution System reliability. One of the arguments that must be addressed is how much weighting does Daimler Chrysler ( or any other manufacturer ) put on the issue of power quality in the decision making process when 1) maintaining and expanding the existing operation, and 2) when deciding on the location of a new plant. What are there basic minimum outage requirements for a plant to remain operational in the Daimler family. I realize depending on the product line and the type of plant ( assembly or feeder) will have an effect on the requirements.

John, any documented information on this subject would be greatly appreciated and may go a long way in the future to insure that the City of Windsor remains competitive in attracting and maintaining a vibrant

auto industry now and in the future. I have a tight time line on this report and I would appreciate the information asap. Thanks in advance.

Tom Kosnik MASc., P.Eng.  
President  
EnWin Powerlines  
519-251-7304  
tkosnik@enwinpowerlines.com



KAUTEX TEXTRON, NORTH AMERICA  
SUBSIDIARY OF TEXTRON AUTOMOTIVE

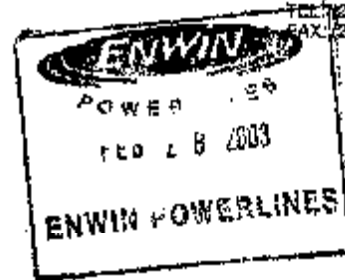
750 STEPHENSON HIGHWAY  
TROY, MICHIGAN 48063

February 24, 2003

EnWin Powerlines Ltd.  
4545 Rhodes Drive  
Windsor ON N8W 5T1

Attention: Klaas DeGroot, President

Dear Mr. DeGroot:



TEL: (248) 616-5100  
FAX: (248) 616-5385

**Re: Reliability of EnWin Electricity Distribution Service to  
Kautex Textron's Windsor Plant**

I am the President of North American Operations for Kautex Textron GmbH & Co. ("Kautex"), a world leader in the automotive and packaging industries. Kautex is a division of Textron Inc., multi-industry company with revenues of \$12 billion; 51,000 employees; and a diverse, global customer base. Familiar Textron brand names include Bell Helicopter, Cessna Aircraft and E-Z GO Golf Cars.

Kautex is a leading manufacturer of plastic fuel tank systems, automatic clear vision systems, blow-molded functional components, modular fluid management systems and fuel filler assemblies. Kautex has over 4,800 employees in 31 locations in 16 countries. Five of those locations are in North America. Since 1986, Kautex has had a plant in Windsor, Ontario, located at 2701 Kautex Drive. That plant employs 502 Windsor and area residents, and manufactures fuel system components, including blowmolded plastic gas tanks, for the North American automotive industry.

As with most members of the automotive industry, and many of EnWin's customers, Kautex uses highly automated manufacturing processes. A reliable supply of electricity is essential to Kautex's operations, as outages cause significant downtime for the plant resulting from the need to reset equipment and restart those processes, as well as losses attributable to reduced output, ruined product and wasted material. In recent years, Kautex has viewed with growing concern the lack of reliability of electricity delivery to its Windsor plant. In the four-month period between July and October of last year alone, Kautex experienced nine outages on the following days:

17 July 2002  
18 July 2002  
21 July 2002  
22 July 2002  
13 September 2002  
16 September 2002  
28 September 2002  
21 October 2002 (2 outages)

This would likely not be acceptable to any of your electricity distribution customers – it is particularly unacceptable for a modern manufacturing facility. Close to three years ago, in July and August of 2000, we met with EnWin representatives to discuss your excessive outages. At that time, your representatives advised that Kautex was the only company in the EnWin service area experiencing interruptions with this frequency. EnWin installed some lightning protection, but the outages continued. We met with your staff in early October of 2002 to discuss the frequent outages in the preceding months. That meeting was followed by more outages.

We met again late last year with Mayor Hurst of Windsor, who assured us that EnWin would try to avoid further voltage fluctuations. EnWin shared with us the cost of a study to determine whether there were measures that could be taken with Kautex's plant and equipment to increase our resistance to voltage fluctuations. We appreciate EnWin's participation in that study, and we anticipate implementing some of its recommendations. However, the majority of the outages mentioned above would not have been prevented by work on Kautex's equipment, nor would they have been prevented even if Kautex were to install its own on-site back-up generation.

Another particularly damaging example of EnWin's ongoing reliability problems occurred at approximately 4:00 a.m. on Saturday, February 1, 2003. Kautex and, we understand, a number of EnWin's other industrial customers, suffered a complete loss of power. EnWin staff have suggested that it may have been the result of a burnt conductor at one of your substations. In our case, the outage lasted for four minutes, but the impact of the outage was significant. Among the consequences of EnWin's outage were the following:

- Kautex's plastic extruders "froze", leaving molten plastic hardening in them (the Kautex plant was in full operation at the time). This necessitated the cleaning of the extruders. Plastic being processed by the extruders had to be scrapped.
- As noted above, Kautex's facilities and processes are highly automated, although this is not unusual among EnWin's industrial customers given the level of automotive manufacturing that takes place in Windsor. As a result of your outage, we had to reboot and "re-home" all of our robotic equipment, as the outage effectively wiped out the robots' memory.
- Kautex's plant was not fully back in operation until Monday, February 3, 2003.
- Because parts are supplied to the automotive industry on a "just-in-time" basis, Kautex was forced to increase its production and ship its product on an expedited basis, at significantly higher cost, to meet its delivery commitments to automobile manufacturers, failing which, they would have had to curtail or suspend their own production. In one case, Kautex had to fly gas tanks to one auto manufacturer's plant in the United States in order to meet that manufacturer's production schedule and enable it to keep its plant running.



- Kautex's estimate of the costs arising out of your outage is over \$160,000.00 in lost production hours, wasted materials and additional shipping costs.

We are extremely concerned that electricity delivery to our Windsor plant in recent years has been less reliable than the electricity delivery to any of Kautex's other North American facilities, in Avilla, Indiana; Wilmington, Ohio; Lavonia, Georgia; or Puebla, Mexico. This is entirely unacceptable. We understand that the Ontario Energy Board's Distribution System Code requires you to "maintain [your] distribution system in accordance with good utility practice and performance standards to ensure reliability and quality of electricity service, on both a short-term and a long-term basis." You must inspect your system and address any defects that you discover during your inspections, within a reasonable length of time. We also understand that EnWin is required to file data on various service quality indices with the Ontario Energy Board on a monthly basis.

We request that you immediately investigate this matter, and advise us as you how EnWin intends to eliminate its service interruptions and provide and maintain reliable electricity delivery service to Kautex. Please contact Daniel Mills, Vice President of Operations, at our Windsor plant, should you require further information regarding Kautex and its operations. If we have not received a response from you within two weeks of the date of this letter, or if your proposed remedial plan is not satisfactory, we may have little choice but to pursue this matter with the Ontario Energy Board and/or the Minister of Energy.

Yours very truly,

*Robert K. Simpson*

Robert Simpson

**Windsor Mold, Malden**  
4035 Malden Road  
Windsor, ON N9C 2G4  
519-972-9032 Tel  
519-972-0510 Fax

**Windsor Mold, Durham**  
1628 Durham Place  
Windsor, ON N8W 2Z8  
519-258-7300 Tel  
519-258-0852 Fax

**Contacts:**

Greg Mahoney, General Manager, [gmahoney@windsormoldgroup.com](mailto:gmahoney@windsormoldgroup.com)  
Joe Dumouchelle, Technical Automation Manager, [jdumouchelle@windsormoldgroup.com](mailto:jdumouchelle@windsormoldgroup.com)  
John Bogdanovic, Maintenance Supervisor, [jbogdanovic@windsormoldgroup.com](mailto:jbogdanovic@windsormoldgroup.com)

**ENWW Utilities Ltd.**  
787 Ouellette Avenue  
P.O. Box 1025  
Station A  
Windsor, Ontario  
N9A 5T7  
**Contact: Tom Kosnik**

Thursday, July 15, 2004

**Request for monitoring solution of supplied power**

Error Message/Condition is: Multiple and simultaneous electrical related failures within the above mentioned plants

To Whom It May Concern:

We are requesting your assistance in trying to identify potential root causes of equipment failures in our manufacturing facilities. While equipment failure occurs under normal operating circumstances we have noted that in the last two months a rash of simultaneous and unexplained equipment failures. We unfortunately cannot identify exact dates and times but for this exercise we will approximate the dates. Understand we are not considering issues during inclement weather conditions.

**Malden Issues**

**Friday July 9, 2004 in the AM hours** we experienced multiple hardware failures and various pieces of computer and related equipment at the same time. Weather was a non-issue at this time. Equipment included two computer keyboards and one PC (Personal Computer) based power supply. These computers are located in different areas of the building on different branch circuits. The PC power supply is for a PC based control for a CMM (Coordinate Measuring Machine). We are still experiencing drifting of this machines axis during the nighttime hours which is yet unresolved. These axis's motions are controlled by 12 volts supply on a handheld control, and when the supplied power fluctuates it causes movement in the machine. This machine while monitored during the day does not exhibit this condition.

**Friday May 21, 2004 in AM hours** we experienced simultaneous equipment failures on three different pieces of equipment on the same branch circuit. That circuit is for the machine bay at Malden. Two large boring mills called the G&L and Kuraki, and the large crane in that bay were affected. The G&L lost a power supply for one of the axis drives. The Kuraki blew a chip on one of the control circuit boards. The large crane had lost its drive parameters. The service technician for the crane offered no explanation as to why this could have happened.

**Intermittent failures;**

Month of June 2004. We installed a motor drive for a movable Chip Bin Roof. It intermittently was failing causing the motors to oscillate and as such they were not able to perform the function designed. It was identified by the manufacturer that the fluctuation of supplied power was the root cause. They have replaced that motor drive with a new unit that addresses this condition and we have not observed the problem since.

We have observed UPS (Un-interruptible Power Supplies) and line conditioners throughout the plant engaging as required to address voltage fluctuations.

During these minor fluctuations we have one large CNC Milling Machine called the Pargas BF-200 that will lose its position causing a stop for error condition. This machine is sensitive to power fluctuations and as a result it is a good indicator of potential problems to come.

**Months of June and July 2004**, we have a High Speed CNC machine called the OMV. It has suffered intermittent failures in the graphical display (LCD Screen). We were unable to duplicate the problem during these months, and had outside service people in during these times. The condition would correct itself and we were unable to identify what exactly the issue was. Recently the LCD screen became damaged due to an electrical failure in the power supply. Note this power supply converts the AC 110V source to 12VDC. We cannot identify root cause on this situation but when we consider all other occurrences of late supplied power must be considered.

#### **Durham Issues**

Week of June 22, 2004, the Durham plant experienced a brown out causing most of our equipment drives and breakers to trip. One of our wall mounted transformers started to smoke during the brown out.

We have provided this information only to demonstrate that there do currently exist conditions we consider being outside the norm. As such we would appreciate a monitoring solution of our supplied power. We would encourage any technical expertise and assistance to help us identify a possible root cause.

Sincerely

John Bogdanovic

November 22, 2004

Mr. John Bogdanovic  
Maintenance Supervisor  
Windsor Mold, Malden  
4035 Malden Road  
Windsor, ON N9C 2G4

Re: Request for monitoring solution of supplied power

Dear John:

We have received your letter issued on July 15, 2004 regarding Monitoring Solution of Supplied Power.

The major concerns indicated in your letter are

1. Voltage fluctuations in Malden plant.
2. Failure of multiple hardware and PC power supply in Malden plant.
3. Week of June 22, 2004, the Durham plant experienced a brown out causing most of our equipment drives and breakers to trip.

To understand the power supply quality to your plants, ENWIN has installed power quality monitors in both Malden and Durham plants. The monitoring results are shown in Table 1.

Table 1

PLANT	VOLTAGE VARIATION, V	THD, %	TDD, %
Malden	564 - 595, L-L	1.4	10.4
Durham	329 - 360, L-G	2.8	10.2
ENWIN standard	550 - 625, L-L 318 - 360, L-G	1.5	5.0

**1. Power Quality at 4035 Malden**

Feeder 24M6 supplies the power to this plant through customer owned transformer Y99.

The location was monitored between August 3 and August 10.

There were no interruptions on the customer site and breaker activities on adjacent feeders during the monitored period based on our record.

The recorded information shows that the voltage variations, 564 V to 595 V, in the plant are all within the acceptable range (see Figure 1 and Table 1).

The recorded information also shows that there are power quality problems in the plant because the Total Demand Distortion (TDD) of current is higher than 5% (see Figure 2).

## **2. Power Quality at 1628 Durham Place**

Feeder 55M2 supplies the power to this plant through ENWIN owned transformer P550.

There were no interruptions on the customer site and breaker activities on adjacent feeders during the period based on our record.

In addition, there are no voltage sags recorded on the recloser on 55M2 during the period.

The recorded information shows that the voltage variations, 329 V to 360 V, in the plant are all within the acceptable range (see Figure 3 and Table 1).

The recorded information shows that the currents vary very much from time to time during the monitored period. The variation may cause problems in the plant in the future.

The recorded information also shows that there are power quality problems in the plant because the Total Harmonic Distortion (THD) of the voltages is higher than 1.5% and the TDD of the currents is higher than 5% (see Figure 4 and 5).

## **3. Harm in Harmonics**

The harmonics in both plants are high. Harmonic currents the following undesirable effects:

- a. Significant effects on the performance of computer power supplies.
- b. Heating of magnetic devices, which can cause premature insulation failure and breakdown.
- c. Triple harmonics produce higher than expected neutral currents, potentially resulting in insulation damage and breakdown due to temperature rise.
- d. High frequency fields that can introduce buzz into telephone lines and corrupt data in adjacent data lines.

## **4. Conclusion**

- Voltage fluctuations

There were no voltage fluctuations exceeding the acceptable range during monitored period.

You mentioned that Malden plant voltage has fluctuated from 570 volts to 600 volts in the email on November 22, 2004. The fluctuations are within the acceptable range (see Table 1). Therefore, the equipment should

operate properly. Otherwise, the manufacturers should compensate your damage and improve their products.

- Failure of multiple hardware and PC power supply.  
Computer power supplies are usually designed to operate over a range of AC input voltages. They produce a DC voltage that is affected by the waveshape of the AC waveform. Harmonic distortion has the effect of actually reducing the computer power supply's operating voltage. That variation is compounded by the normal variation of 10%.

Other hardware failures may be caused by harmonics or voltage fluctuations. However, the fluctuations were within the acceptable range in the monitored period.

The source of the harmonics is likely from your plant because

- There are a few VFD driven machines like large G&L boring mills and CNC Milling Machine that generate harmonics.
- The reclosers on the supply feeders have not caught any harmonics event.
- Week of June 22, 2004, the Durham plant experienced a brown out causing most of our equipment drives and breakers to trip.

An in-line switch was not closed firmly between 9:06 and 9:40 on June 21. Only two-phase supply powered your plant, which caused the brown out.

## 5. Recommendations

Harmonics and supply power interruptions have drawn our attention.

For harmonics, it's recommended that further investigation be conducted to find out the source and harmonics filters be installed if the failures happen again.

We can introduce a couple of independent consultants to you if you are interested.

For supply power interruptions, on one hand, ENWIN has and will continue to implement different measures to reduce the interruptions, e.g., recloser program and feeder reconfiguration. However, some of the outages are difficult to eliminate, e.g., lightning strikes. Ten of the twelve outages shown in Table 2 were caused by lightning.

On the other hand, it is suggested that your equipment's robustness be improved to ride through the momentary interruptions. A breaker open and close would take about 200 ms.

The breaker activities on Malden feeders are listed Table 2. The activities occurred on Friday May 21, 2004 in AM hours, Friday July 9, 2004 in the AM hours, and in Months of June and July 2004.

The interruptions caused voltage drops on the feeder and adjacent feeder, which may impact your plant.

Table 2

DATE OFF	DATE ON	TIME OFF	TIME ON	HOURS OFF	FEEDER	WEATHER	CAUSE IN DETAIL
20040707	20040707	1500	1500	0	24M6-RC1	THUNDERSTORM	UNKNOWN
20040521	20040521	2318	2318	0	24M6	THUNDERSTORMS	24M6-RC1 A/R - CAUSE UNKNOWN
20040707	20040707	1500	1500	0	24M6	THUNDERSTORM	UNKNOWN
20040705	20040705	1918	1941	0.38	24M6	CLEAR	HYDRO ONE 230 CCT TRIPPED
20040617	20040617	506	506	0	24M5	THUNDERSTORMS	UNKNOWN
20040614	20040614	1608	1608	0	24M5	T-STORM	24M5 A/R
20040609	20040609	2034	2034	0	24M5	RAIN	24M5 A/R - CAUSE UNKNOWN
20040617	20040617	506	506	0	24M5	THUNDERSTORMS	CCT PATROLLED OK
20040614	20040614	1607	1607	0	24M2	T-STORM	24M2 A/R
20040614	20040614	1608	1759	1.85	24M2	T-STORMS	24M2 A/R/A
20040521	20040521	42	42	0	24M1	STORMS	A/R ON 24M1 - CAUSE UNKNOWN
20040614	20040614	1608	1609	0.03	24M1	T-STORM	24M1 A/R/A

I trust that I have covered all of the points that we concern. If you have any questions please give me a call at the number listed below.

We appreciate your comment on our supply quality and we also apologize for the brown out in Durham plant.

Yours truly,

Gene Liu, P.Eng.  
System Planning Engineer - ENWIN Utilities Ltd.  
(519) 251-7300, ext. 246; Fax: (519) 251-7306  
Email: [zliu@enwinpowerlines.com](mailto:zliu@enwinpowerlines.com)

CC: Tom Kosnik  
Shawn Filice  
James Brown

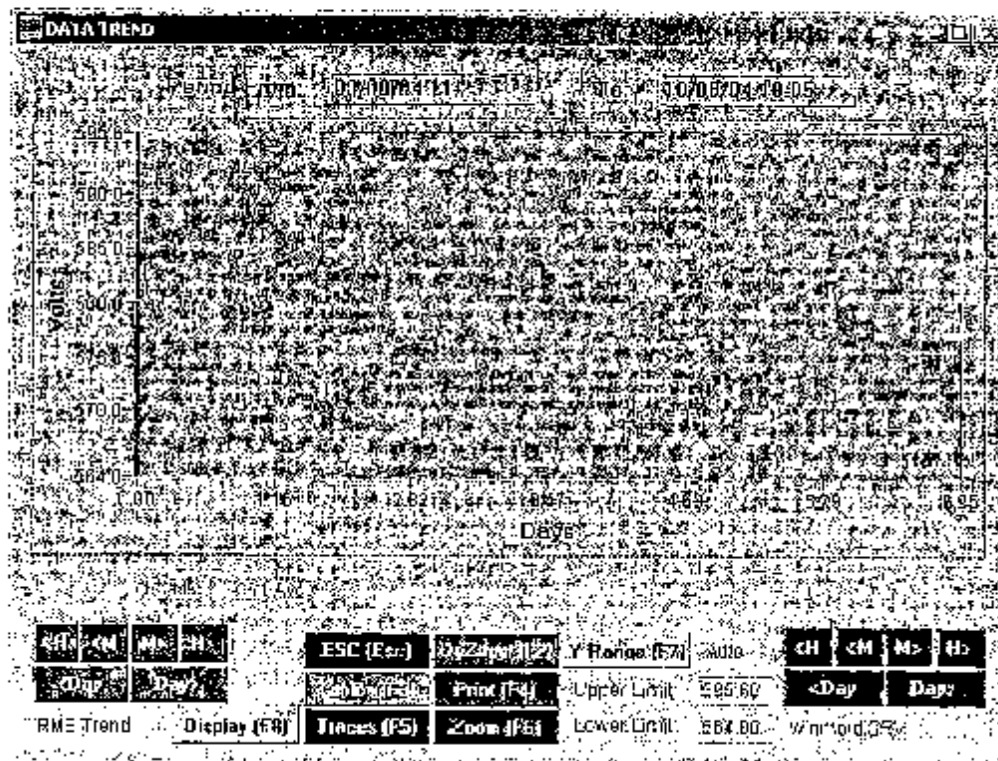


Figure 1: Voltage Profile at Maiden

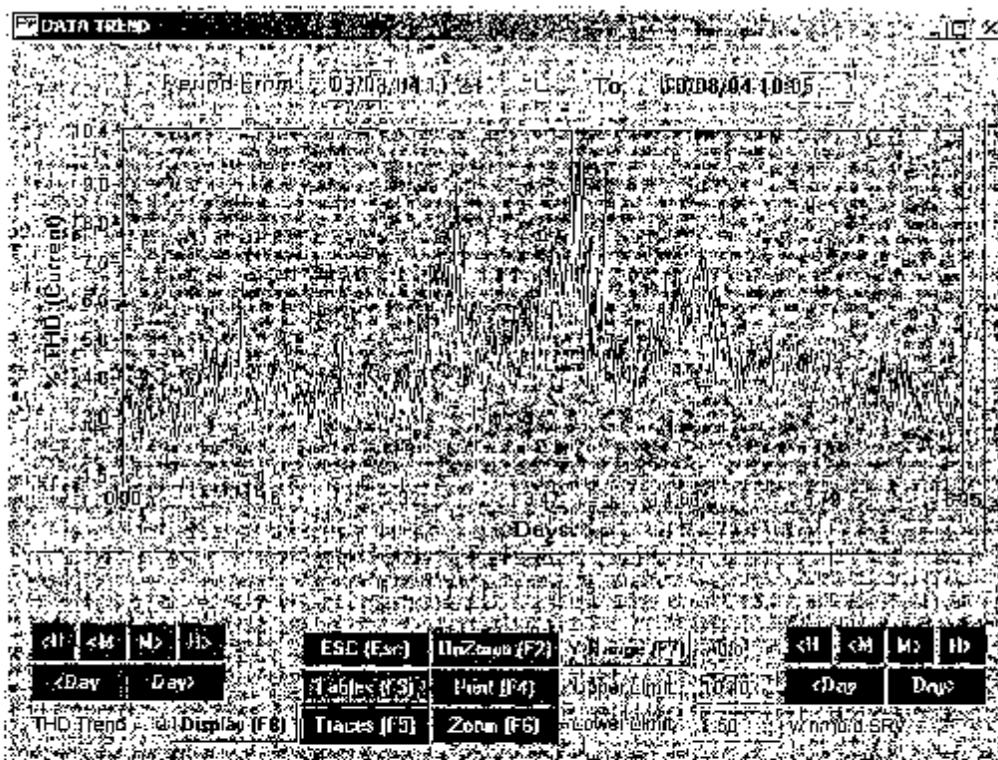


Figure 2: Current TDD Trending



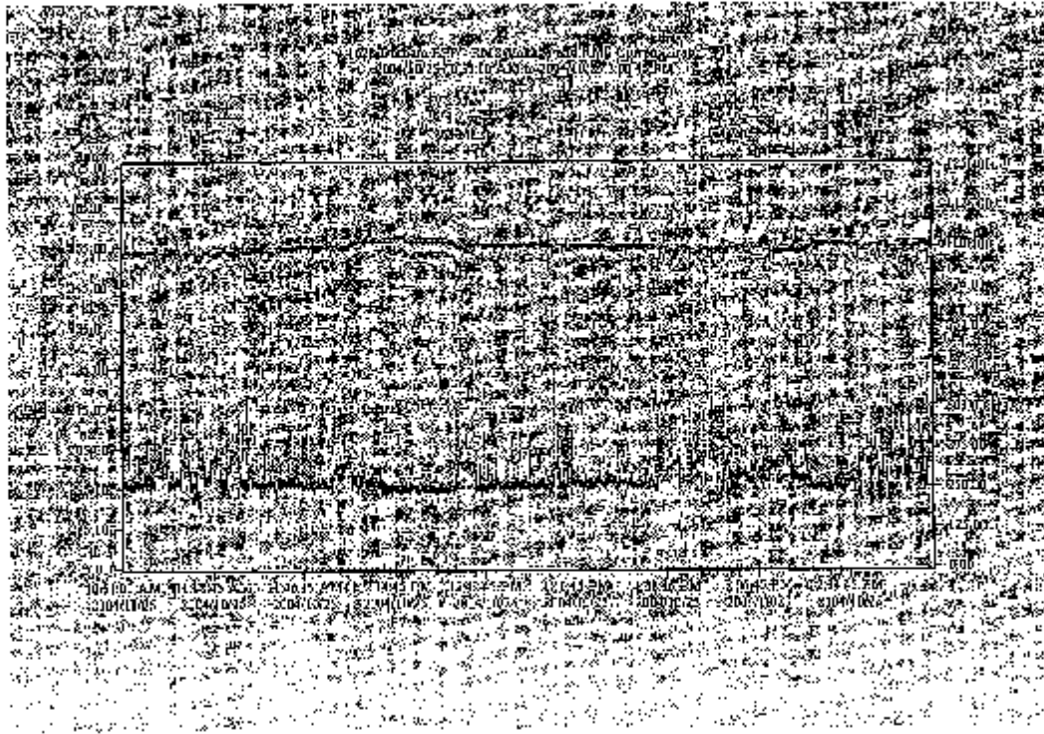


Figure 3: Voltage and Current Profile at Durham

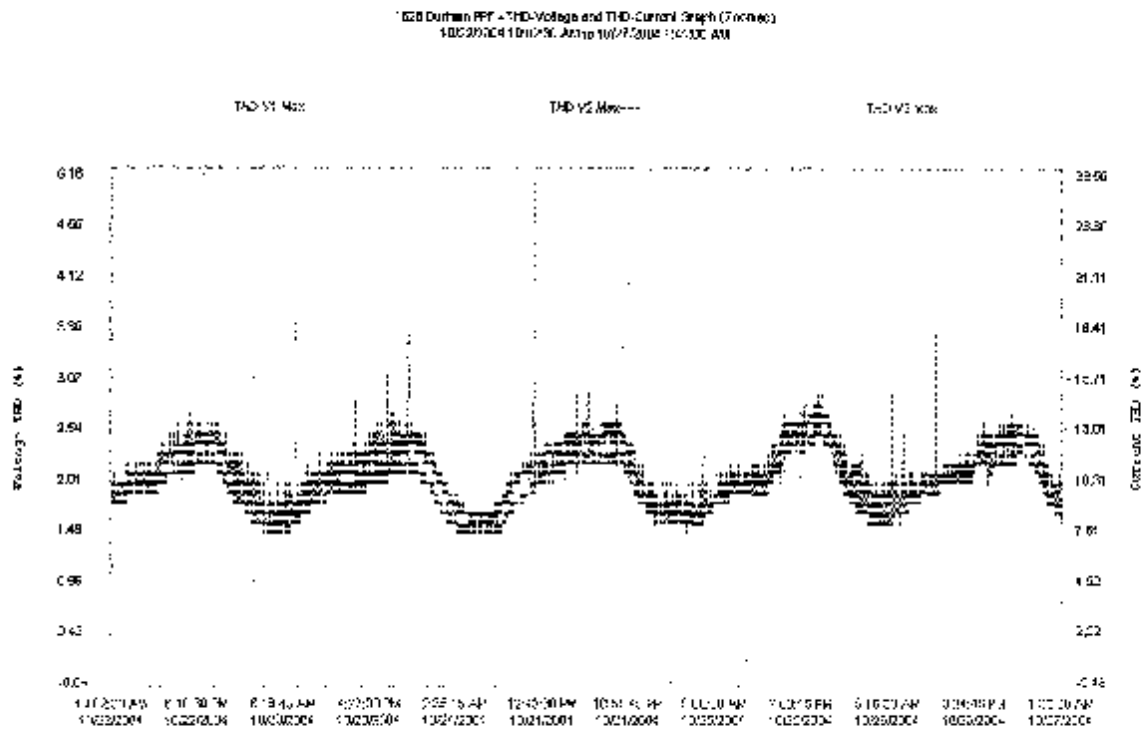


Figure 4: Voltage THD Trending

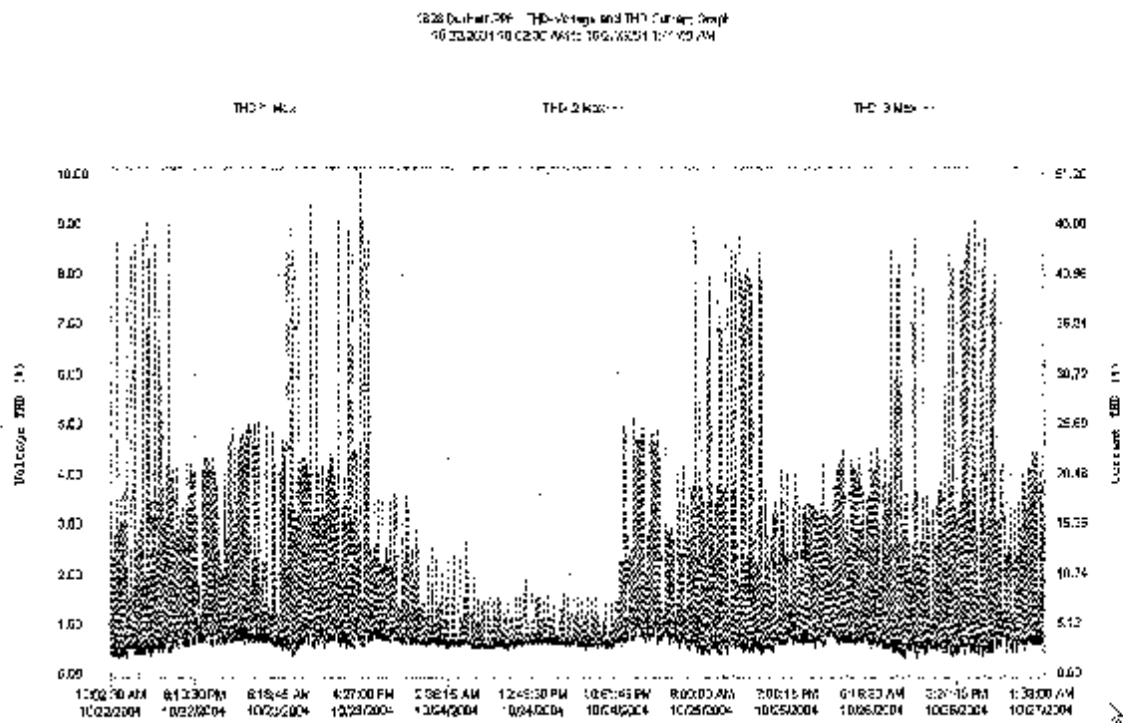


Figure 5: Current THD Trending

**Tom A Kosnik**  
02/01/2005 10:32 AM

To: Shawn C Filice/EWP/Windsor@WINDSOR  
cc:  
Subject: Re: Letter to Windsor Mo.d regarding power quality

Can you arrange to have clerk check for a RMS file called Power Quality - for any recent Commercial customer complaints- for inclusion in your report

Tom Kosnik M.A.Sc., P.Eng.

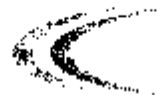
President

EnWin Powerlines

519-251-7304

tkosnik@enwinpowerlines.com

----- Forwarded by Tom A Kosnik/EWP/Windsor on 2005-02-01 10:30 AM -----



**John P Temporal**  
2005-02-01 10:24 AM

To: Tom A Kosnik/EWP/Windsor@WINDSOR  
cc: James F Brown/EWP/Windsor@WINDSOR, Marvio C  
Vinhaes/EWP/Windsor@WINDSOR  
Subject: Re: Letter to Windsor Mo.d regarding power quality

Hi Tom:

I reviewed the General Complaints file and did not find any letters from commercial or industrial customers complaining about power quality.

I also reviewed the Suite Response Issues back to November 1, 2004 and found the following issues:

3911 Tecumseh E	City of Windsor	<input type="checkbox"/> flickering lights
2960 Huron Church	Feel Good Rest.	<input type="checkbox"/> Low voltage
1605 Provincial	Pattison Sigr.	<input type="checkbox"/> Low voltage
1004 Garden Court	Garden Crt Condo	<input type="checkbox"/> No power
1531 Crawford	City of Windsor	<input type="checkbox"/> No power
1531 Crawford	City of Windsor	<input type="checkbox"/> No power
3120 Dougall	Wal-Mart	<input type="checkbox"/> No power
7877 Tecumseh E	Imperial Oil	<input type="checkbox"/> No power
2397 Walker	Valdez Eng.	<input type="checkbox"/> No power

John

Tom A Kosnik

**Tom A Kosnik**  
2005-01-31 03:44 PM

To: John P Temporal/EWP/Windsor@WINDSOR  
cc: James F Brown/EWP/Windsor@WINDSOR, Marvio C  
Vinhaes/EWP/Windsor@WINDSOR  
Subject: Re: Letter to Windsor Mo.d regarding power quality

Do we have any recent letters on file from commercial or industrial customers complaining about power quality?

Tom Kosnik M.A.Sc., P.Eng.

President

EnWin Powerlines

519-251-7304

tkosnik@enwinpowerlines.com

John P Temporal



**John P Temporal**  
2005-01-31 12:20 PM

To: James F Brown/EWP/Windsor@WINDSOR  
cc: Marvio C Vinhaes/EWP/Windsor@WINDSOR, Tom A  
Kosnik/EWP/Windsor@WINDSOR

Subject: Re: Letter to Windsor Mold regarding power quality

Hi Jim:  
I check our files and could not find the letter referenced by Tom.  
John  
James F Brown



James F Brown  
2005-01-31 09:10 AM

To: John P Temporal/EWP/Windsor@WINDSOR, Marvio C  
Vinhaes/EWP/Windsor@WINDSOR  
cc: Tom A Kosnik/EWP/Windsor@WINDSOR  
Subject: Re: Letter to Windsor Mold regarding power quality

John/Marvio,

Could you review the files on this and see if there are any letters as referenced by Tom, below. If so, please forward him a copy ASAP or advise him that there are none.

thanks.....Jim

James F. Brown, P. Eng.  
Director, Engineering  
EnWin Powerlines Ltd  
(519) 251-7300 x 267 office  
(519) 251-7309 fax  
(519) 818-4424 cell

----- Forwarded by James F Brown/EWP/Windsor on 01/31/2005 09:07 AM -----

Tom A Kosnik  
01/31/2005 08:14 AM

To: James F Brown/EWP/Windsor@WINDSOR  
cc: Debbie J Loeffen/EWP/Windsor@WINDSOR, Shawn C  
Filice/EWP/Windsor@WINDSOR, Zhiqiang  
Liu/EWP/Windsor@WINDSOR  
Subject: Re: Letter to Windsor Mold regarding power quality

Jim, I am looking for any original letters of complaint from our customers regarding power Quality, so that we can we can incorporate copies of them in the Power Quality report to the board on reclosures.  
Tom Kosnik M.A.Sc., P.Eng.  
President  
EnWin Powerlines  
519-251-7304  
tkosnik@enwinpowerlines.com  
James F Brown



James F Brown  
2005-01-31 08:01 AM

To: Tom A Kosnik/EWP/Windsor@WINDSOR  
cc: Shawn C Filice/EWP/Windsor@WINDSOR, Debbie J  
Loeffen/EWP/Windsor@WINDSOR  
Subject: Letter to Windsor Mold regarding power quality

Tom,

I received Debbie's note asking for information regarding Power Quality at Windsor Mold. I received a copy of the letter below from Gene. I did comment back to Gene on the original letter and suggested some improvements. I believe Gene revised the letter and sent it out. I do not have an electronic copy of the final letter. I believe the gist of Gene's note is that their problem is most likely caused by conditions in

their own plant.

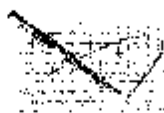
Gene also made a further suggestion internally that we consider obtaining a better quality PQ monitor.

If there is any way I can be of further assistance, please advise.

Thanks.....Jim

James F. Brown, P. Eng.  
Director, Engineering  
EnWin Powerlines Ltd.  
(519) 251-7300 x 267 office  
(519) 251-7309 fax  
(519) 818-4424 cell

----- Forwarded by James F Brown/EWP/Windsor on: 01/31/2005 07:53 AM -----



Zhiqiang Liu  
11/23/2004 01:24 PM

To: Tom A Kosnik/EWP/Windsor@WINDSOR  
cc: Shawn C Filice/EWU/Windsor@WINDSOR, James F  
Brown/EWU/Windsor@WINDSOR  
Subject: Letter to Windsor Mold regarding power quality

Could you please review and comment on the attached letter before I send it out?

Thanks.



4035 Malden-1.doc

Gene

SEC\_IRR\_15

SEC\_IRR\_15

Description of ENWIN Utilities Ltd. Information Technology Department

The Information Technology department at ENWIN Utilities Ltd. provides technology services to ENWIN Utilities, ENWIN Energy and The Windsor Utilities Commission. The department is divided into two areas – Systems Development and Technology Services and Support which provide administration and support services to approximately 370 employees located at three company sites.

Technology services provided include:

- Maintenance and support of all ERP systems (Customer Information and Billing, Meter Reading, Meter Management, Customer Service Requests, Human Resources and Payroll, Financials, Work and Asset Management, Business Intelligence, Tier 1 and 2 Help Desk Support, GIS, and Mobile).
- Maintenance and support of internally developed corporate systems (Storm Outage, Transformer Loading, Overtime Callout, Ad-hoc reporting).
- Interfaces between external and internal systems.
- Business and process analysis and design.
- Lotus Notes Email and Scheduling, Domino Server, Blackberry devices and Blackberry Enterprise Server.
- Corporate telephone system, Contact Centre 6.0 software.
- Systems administration and support of all corporate servers, desktops, laptops, printers and fax machines.
- Network administration of corporate WAN, LAN, VLAN between three locations.
- Corporate training for all corporate application systems.
- Subject matter expert support for Help Desk.
- Daily production processing of meter readings, customer payments, bills and notices, financial postings and reports.
- Daily backups of all corporate data.
- Database administration and support.

**Information Technology FTE**

**EnWin Utilities IT FTE - including Shared FTE**

	<b>2007</b>	<b>2008</b>	<b>2009</b>
<b>Executive</b>	1	1	1
<b>Management</b>	2	2	2
<b>Non Union</b>	13	14	17
<b>Union</b>	8	8	8
	<u>24</u>	<u>25</u>	<u>28</u>

**Information Technology FTE  
Net of those Allocated to Affiliates**

	<b>2007</b>	<b>2008</b>	<b>2009</b>
<b>Executive</b>	0	0	0
<b>Management</b>	1	1	1
<b>Non Union</b>	7	8	10
<b>Union</b>	4	5	5
	<u>13</u>	<u>14</u>	<u>16</u>

The significant change expected within the IT Department, included in the Test Year budget, includes an increase in the acquisition of new servers and operating system Software as many of EWU's IT assets will be at the end of their life-expectancies and are accordingly scheduled for replacement (Exhibit 2-1-1, page 43-44). Also included in the Test Year budget is the completion of the VOIP Project required to satisfy the need to provide a higher degree of service for the EWU customer base (Exhibit 2-1-1, page 51-51) as well as the Comprehensive ERP System (Exhibit 2-1-1, page 59-62). Operating Costs are anticipated to increase for the maintenance contracts in the Test Year to support the new Comprehensive ERP System and VOIP Projects along with the additional FTE required to successfully implement these projects.

**Capital Expenses for Information Technology**

	<b>2007</b>	<b>2008</b>	<b>2009</b>
<b>Information Technology</b>	\$86,806	\$1,271,849	\$8,400,260

**Operating Expenses for Information Technology**

	<b>2007</b>	<b>2008</b>	<b>2009</b>
<b>Information Technology</b>	\$1,697,648	\$1,964,739	\$2,497,800

\*\* Operating Expenses are net of those allocated to affiliates



SEC\_IRR\_16



## Business Case – Creation of Programme Management Office

October 4, 2007

### 1. Project Summary:

The Project was created to determine the need for a Project Management Office within *EnWin* Utilities Ltd. that would have responsibility for inter-company projects

(a) Project Initiator:

Joe Levack

(b) Project Sponsors

Joe Levack, John Wladarski

(c) Project Description

Develop a PMO process template that is suitable for inter-company projects.

(d) Needs and Scope

PMO office is required to create and maintain a common Project Management Process for *EnWin* Utilities Ltd and the Windsor Utilities Commission.

(e) Target Customer

Sponsors and project initiators within the Companies

(f) Objectives, and outcomes

- § Provide centralized Programme Management to meet the needs of the entire organization.
- § Creates a centralized resource pool for the organization
- § A standard Project Management package can be developed
- § Establishes a means for managing projects more efficiently
- § Encourages and requires appropriate communication and planning prior to the start of a project



- § Will enable tracking of progress of projects against pre-determined metrics and facilitate standardized reporting
- § Will build on best practices and lessons learned over time.

(g) Duration:

Ongoing, as long as a need for projects exists within the Companies.

(h) Leadership requirements:

Manager required part-time managing department operations

(i) Team skill requirements:

Project Manager with minimum 5 years project experience  
Clerical assistance with computer skills, general office management abilities

2. Statement of Need

(a) Unmet need

Currently there is no formal Project Management Methodology; Capital Projects in both Water and Hydro are often completed late and/or over budget. Operations, PM and repairs can be more efficient.

(b) Anticipated benefits

- § Work with Executive Management to prioritize the organization's projects
- § Staff can be trained in best practices
- § Create a common language for communicating about project management
- § Independent evaluation of project results
- § Independent recommendation of areas for improvement

(c) Specific business needs now and future

The Companies must improve their operational and capital efficiency in order to maintain the lowest possible rates to the benefit of ratepayers and to provide a ROI to the Shareholder that is acceptable.



(d) How was the need determined

The Analysis of Capital Cost and Operating Cost to Budget in addition to the Analysis of the hours of productivity for crews in Hydro and Water.

(e) Supporting data

Hydro Major Capital and Line Work:

Labour to install: (Average Hrly Rate: \$30.00)

One hydro pole requires approximately: 10 hours: \$300.00  
One Transformer requires approximately: 31 hours: \$931.00  
One metre of cable requires approximately: 1.5 hours \$ 45.00

Above based on Hydro Installation information provided:

From 2004 to 2006

Average number of poles installed per year: 559  
Average number of transformers installed per year: 265  
Average metres of cable installed per year: 28,600

Average annual hours, pole installation: 5,590  
Average annual hours, transformer installation: 8,215  
Average annual hours, cable installation: 42,900

Total hours: 56,705 @ \$30.00 = \$ 1,701,150.00

Hydro Operating Work:

Estimated Hydro and Water lose 2.75 hours per field worker daily in avoidable down time.

Estimated Hydro and Water lose 1.75 hours per non-field worker daily in avoidable down time

Hydro:

Field Workers: 50  
Average Hrly Rate: \$30.00  
Annual Working Days: 250  
Annual Hours Lost: 34,375 representing \$1,031,250.00



Non-Field Workers:

Non-field Workers: 30  
Average Hrly Rate: \$ 25.00  
Annual Working Days: 250  
Annual Hours Lost: 13,125 representing \$ 328,125.00

Water

Field Workers: 50  
Average Hrly Rate: \$30.00  
Annual Working Days: 250  
Annual Hours Lost: 34,375 representing \$ 1,031,250.00

Non-Field Workers:

Non-field Workers: 24  
Average Hrly Rate: \$25.00  
Annual Working Days: 250  
Annual Hours Lost: 10,500 representing \$ 262,500.00

---

Total	\$2,653,125.00
-------	----------------

Water Capital work is not considered as most is completed by Contractors

Currently work is progressing on the creation of Job Plans for all activities performed by outside crews in both Hydro and Water. When complete, anticipated prior to July 2008, each activity in each Job Plan will have been assigned an estimated time. The total time represented by the time for each job multiplied by the number of times that job will be performed annually, will be the starting point in hours, from which I propose the performance of the PMO will be measured. As the work is performed and time recorded accurately, with Managers analyzing and acting on the information, I anticipate a measurable improvement in the time taken to perform the various tasks within the Job Plans. This measurable improvement will be used to offset the cost of creating and operating a PMO.

The annual operating cost of the PMO, estimated at \$230,000 (See Financial, Page 5) represents approximately 7,660 employee hours annually.



The total number of hours lost considering field, and non-field workers are approximately: 92,375, representing \$ 2,653,125.00.

The cost of the PMO therefore, represents approximately 8% of the cost of the number of hours lost and/or available for improvement.

It is suggested therefore, that the risk of the PMO not achieving an 8% improvement in operations is small. This improvement translates to approximately 7 minutes\*\* per operation and capital employee (field and non-field) per day.

**\*\***(20% 56,705 hrs + 93,375 hrs X 60) : (7660 hrs X 60)

Not considered in this analysis is the benefit realized from creating Job Plans that will store knowledge and create consistent work practices throughout the organization, and enable Managers, when complete to access Key Performance Indicators. Further, the Job Plans will give an indication of the number of FTE required to perform much of the work required on an on-going basis.

In summary, the Business Case requests a one time investment of \$60,000 for office equipment and possible renovations, as well as an annual operation cost of \$230,000.00 for a PMO office creating an opportunity to realize an annual operational saving of \$2,993,355.00\* over three to five years.

**\***(100% of operational \$2,653,125.00 +20% of Capital \$1,701,150.00)

(f) Names of stakeholders supporting the proposal

Joe Levack, Vice President, Hydro Operations  
John Wladarski, Chief Operating Officer, Water Operations

(g) Consequences of not proceeding

Status Quo. Unlikely any significant improvement to existing procedures, policy or process resulting in similar inefficiencies and budget overruns in future.

(h) Assumptions made

It is assumed that the PMO will be able to increase the wrench time for both Capital and Operating work by auditing, monitoring and improving processes resulting in lower duration Job Plans.



(i) Alignment with company policies and strategy

Reduction of Capital and/or Operating cost to produce and distribute water and electricity to ratepayers is the main strategy of the Companies.

(j) Changes to business processes

A formal Programme Management Process will be developed that is suitable, for most projects with which the Companies will become involved.

Managers improving and Monitoring Maximo Software Job Plans, PM Schedules and Work Orders will reduce the Operating Cost of the Companies and likely prolong the life of assets.

3. Financial

(a) Capital cost

Equipment (desks, computer etc)	\$20,000
Possible Office Renovations	\$40,000

(b) Operating cost

Sr. Manager (part time)	\$65,000 including benefits
Project Manager new:	\$100,000 including benefits
Clerical Assistance new:	\$65,000 including benefits

(c) Impact on HR

Likely increase in head count by 2. HR will be required to recruit suitable candidates.

4. Implementation strategy

- § Submit for approval
- § Receive approval
- § Create job descriptions for PM & clerical
- § Recruit suitable candidates, internal or external, with HR
- § Work with Site Dept for suitable office location
- § Source workstations, computers etc
- § Sr. Manager & PM Develop Project Management Process
- § Communicate, train as necessary, internal users on processes and Job Plans
- § Receive planning requests



§ Resource for Hydro & Water Planning

5. Critical factors to project

- § Corporate acceptance of the PMO
- § Executive Manager support for PMO, and corrective action follow up
- § Managers and Supervisors must not be roadblocks to success of PMO
- § Managers and Supervisors must remove any roadblocks found in their Departments
- § Skilled personnel in PMO

6. Criteria for measuring success

- § Audit of organization's projects for performance against organization standards, (Job Plan) implement necessary modifications
  - § Evaluation of organization's projects by Job Plan, analysis of duration improvements attributable to PMO
  - § Develop a Project Management Process suitable for the entire organization
  - § Create a classification process based on the amount of work effort and risk required for each project. The classification would be based on the number of person hours estimated to complete the work, not the duration, and the budget for resources, both internal and external.
  - § Create a blended rate for resources by Department.
  - § Create a risk matrix to identify and evaluate risk factors of a project.
  - § Process for managing and management of project scope variations
  - § Project organizational structure
  - § Project Team terms and conditions
  - § Maintain standard and example documents
  - § Set project documentation standards
  - § Training, Mentoring
  - § Standardization and rationalization of processes and procedures
  - § Perform Post Implementation Review of Projects for lessons learned and recommendations.
-



SEC\_IRR\_21

Detail of Amounts in the column "Ret/Other" for 2007 Changes in Exh 2/Tab 1/Sch 1 pg 5-8:

<b>Capital Asset Continuity Statements</b>			
	<b>(2)</b>	<b>Detail of Amounts included in Column (2)</b>	
<i>* Asset retirements and other changes</i>	<b>Ret/Other*</b>	<b>Disposals</b>	<b>Amalgamation</b>
1805-Land			
Gross Assets	-59,548	-59,548	
Accumulated Amortization	0		
Net Book Value	-59,548	-59,548	0
1808-Buildings and Fixtures			
Gross Assets	-6,796	-6,796	
Accumulated Amortization	3,473	3,473	
Net Book Value	-3,323	-3,323	0
1905-Land			
Gross Assets	1,322,514		1,322,514
Accumulated Amortization	0		
Net Book Value	1,322,514		1,322,514
1908-Buildings and Fixtures			
Gross Assets	21,158,187	-39,601	21,197,788
Accumulated Amortization	-2,771,556	19,016	-2,790,572
Net Book Value	18,386,631	-20,585	18,407,216
1915-Office Furniture and Equipment			
Gross Assets	1,123,460		1,123,460
Accumulated Amortization	-676,264		-676,264
Net Book Value	447,196		447,196
1920-Computer Equipment - Hardware			
Gross Assets	2,525,350	-2,522	2,527,872
Accumulated Amortization	-2,062,750	2,522	-2,065,272
Net Book Value	462,600	0	462,600
1925-Computer Software			
Gross Assets	12,881,276		12,881,276
Accumulated Amortization	-11,077,554		-11,077,554
Net Book Value	1,803,722		1,803,722
1930-Transportation Equipment			
Gross Assets	1,957,452	-343,816	2,301,268
Accumulated Amortization	-1,962,598	343,816	-2,306,414
Net Book Value	-5,146	0	-5,146
1935-Stores Equipment			
Gross Assets	18,750		18,750
Accumulated Amortization	-16,946		-16,946
Net Book Value	1,804		1,804
1940-Tools, Shop and Garage Equipment			
Gross Assets	442,530		442,530
Accumulated Amortization	-297,944		-297,944
Net Book Value	144,586		144,586
1945-Measurement and Testing Equipment			

Detail of Amounts in the column "Ret/Other" for 2007 Changes in Exh 2/Tab 1/Sch 1 pg 5-8:

<i>Capital Asset Continuity Statements</i>			
	(2)	Detail of Amounts included in Column (2)	
* Asset retirements and other changes	Ret/Other*	Disposals	Amalgamation
Gross Assets	67,610		67,610
Accumulated Amortization	-35,131		-35,131
Net Book Value	32,479		32,479
1950-Power Operated Equipment			
Gross Assets	15,143		15,143
Accumulated Amortization	-14,063		-14,063
Net Book Value	1,080		1,080
1955-Communication Equipment			
Gross Assets	84,173		84,173
Accumulated Amortization	-69,219		-69,219
Net Book Value	14,954		14,954
1960-Miscellaneous Equipment			
Gross Assets	651,732		651,732
Accumulated Amortization	-39,081		-39,081
Net Book Value	612,651		612,651
2005-Property Under Capital Leases			
Gross Assets	158,669		158,669
Accumulated Amortization	-57,298		-57,298
Net Book Value	101,371		101,371
<b>TOTAL</b>			
<b>Gross Assets</b>	<b>42,340,502</b>	<b>-452,282</b>	<b>42,792,784</b>
<b>Accumulated Amortization</b>	<b>-19,076,931</b>	<b>368,827</b>	<b>-19,445,758</b>
<b>Net Book Value</b>	<b>23,263,571</b>	<b>-83,456</b>	<b>23,347,027</b>

SEC\_IRR\_22

Description	Actual Additions 2006	Budget 2006	Variance 2006 \$	%	Actual Additions 2007	Budget 2007	Variance 2007 \$	%	Actual Additions Nov 30 2008	Budget 2008	Variance 2008 \$	%
Externally Driven	1,541,159	2,916,981	1,375,792	-89%	1,316,077	3,528,957	2,212,880	-158%	2,549,953	2,489,223	160,730	-2%
New Services	1,459,259	2,347,918	888,659	61%	990,227	3,299,357	2,309,130	233%	2,652,405	2,429,849	(222,556)	-8%
IESO Wholesale Meters	81,901	569,033	487,133	595%	325,850	229,600	(96,250)	-30%	(102,452)	59,374	161,826	-158%
Operations Sustainability	4,469,741	6,301,116	1,831,375	-41%	5,327,625	5,953,822	626,197	-12%	9,196,308	7,292,656	(1,903,652)	-21%
4kV Voltage Conversion Program	3,909,260	5,617,343	1,708,083	44%	4,693,458	4,848,911	155,453	3%	8,331,365	5,363,204	(2,968,160)	-36%
27.6kV Pole Replacement Program	65,357	49,709	(15,648)	-24%	17,463	50,000	32,537	186%	70,007	50,000	(20,007)	-29%
Subdivision Re-Cabling									0	684,300	684,300	100%
Emergency Replacement Program	294,848	220,755	(74,093)	-25%	402,825	264,092	(138,733)	-34%	184,217	235,000	50,783	28%
PCB Contaminated Transformer Replacement Program	94,058	85,643	(8,414)	-9%	19,946	0	(19,946)	-100%	69,204	32,000	(37,204)	-54%
Manhole Reconstruction/Reinforcement Program	30,302	-	(30,302)	-100%	0	50,000	50,000	100%	82,352	87,708	5,356	7%
Replacement of End-of-Life Equipment on Customer Property	-	90,040	90,040	100%					100,838	651,944	551,106	547%
Other Distribution Plant	75,916	237,627	161,711	213%	193,934	740,819	546,886	282%	358,326	188,500	(169,826)	-47%
Operations Enhancement	106,960	726,802	619,842	-580%	592,224	756,750	164,526	-28%	778,838	582,378	(196,460)	-25%
Padmounted Switchgear Replacements									0	107,240	107,240	100%
Pole-Top Recloser Program	-	503,641	503,641	100%	372,067	500,000	127,933	34%	502,282	0	(502,282)	-100%
Single-Phase Line Protection	13,507	24,925	11,418	85%	0	28,500	28,500	100%	20,336	15,000	(5,336)	-26%
SCADA Improvements	5,500	152,655	147,155	2676%	220,157	228,250	8,093	4%	183,239	104,711	(78,528)	-43%
Transformer Station Upgrades	87,953	45,580	(42,373)	-48%					72,981	355,427	282,446	387%
Operations Total	6,117,861	9,944,869	3,827,009	63%	7,235,927	10,239,530	3,003,603	42%	12,525,098	10,364,257	(2,160,842)	-17%
Sustainability					398,820	1,428,696	721,876	-181%	532,947	1,079,724	546,777	
Information Technology	0	0	-		86,806	244,296	157,490	181%	153,399	291,924	138,525	
Site Services	0	0	-		215,779	429,500	213,721	99%	266,600	604,000	337,400	
Fleet Support	0	0	-		14,634	48,500	33,866	231%	43,410	27,500	-15,910	
Other	0	0	-		81,601	398,400	316,799	388%	69,539	156,300	86,761	
Enhancements						306,070	306,070	#		1,101,370	1,101,370	
Customer Service	0	0	-		0	306,070	306,070			679,925	679,925	
Fleet Operations	0	0	-		0	0	0			181,445	181,445	
Financial Reporting Software	0	0	-		0	0	0			300,000	300,000	
ERP Systems												
Comprehensive ERP	0	0	-		0				0	0	0	
Administration Total					398,820	1,428,696	721,876	-258%	532,947	2,241,094	1,708,147	321%
GRAND TOTAL	6,117,861	9,944,869	3,827,009	63%	7,634,747	11,668,226	4,033,549	53%	13,058,045	12,605,351	(452,695)	-3%

SEC\_IRR\_23

<b>Gross Capital Asset Account</b>	<b>2007 Actual</b>	<b>2006 Actual</b>	<b>Var \$</b>	<b>Explanation</b>
1830 - Poles, Towers and Fixtures	65,984,013	62,098,318	3,885,695	Variance in gross capital asset accounts here represent the 2007 capital additions.
1840 - Underground Conduit	66,508,714	64,938,453	1,570,261	See explanation above
1850 - Line Transformers	47,975,240	45,781,207	2,194,033	See explanation above
1908 -Buildings and Fixtures	21,292,695	-	21,292,695	2007 amounts are post amalgamation. Previously the services company held the shared assets.
1920 – Computer Equipment - Hardware	2,601,332	-	2,601,332	See explanation above
1925 – Computer Software	12,891,123	9,847	12,891,123	See explanation above
1930 – Transportation Equipment	2,060,925	38,072	2,022,853	See explanation above
<b>Gross Capital Asset Account</b>	<b>2006 Actual</b>	<b>2006 EDR Approved</b>	<b>Var \$</b>	<b>Explanation</b>
1815-Transformer Station Equipment	30,168,503	21,284,255	8,884,249	The 2006 EDR Approved represents the average of the ending 2003 and 2004 contributed capital. The 2006 Actual represents the ending 2006 balance. Therefore, the change represents a portion of the 2004 additions and the 2005 and 2006 additions.
1830 - Poles, Towers and Fixtures	62,098,318	52,662,762	9,435,556	See explanation above
1840 - Underground Conduit	64,938,453	59,650,111	5,288,343	See explanation above
1850 - Line Transformers	45,781,207	40,461,338	5,319,870	See explanation above
1995 – Contributions and Grants – Credit	-8,618,426	-4,691,492	-3,926,934	See explanation above

SEC\_IRR\_28



Enwin Utilities Ltd.  
EB-2008-0227

Schools IR #28

Storm costs included in all expense categories from 2005 to 2009 is shown below:

Account Grouping	2005 Actual	2006 Actual	2007 Actual	2008 Projection	2009 Projection
<b>Maintenance</b>					
5130-Maintenance of Overhead Services	162,207	87,208	46,600	219,036	172,253
5135-Overhead Distribution Lines and Feeders - Right of Way				45,000	54,000
5160-Maintenance of Line Transformers	40,560	9,647	15,713	44,021	48,547
Total Storm Costs in OM&A Expenses	202,767	96,855	62,313	308,057	274,800

SEC\_IRR\_29

Number of Employees/Full-Time Equivalents

	2006		2007	2008	2009
Executive	3		17	17	17
Management	11		24	26	28
Non-unionized	11		32	37	41
Unionized	113		176	183	181
Total	138		249	263	267

Employee Compensation (Wages/Salaries)

	2006		2007		2008		2009	
	Total	Average	Total	Average	Total	Average	Total	Average
Executive	406,537	135,512	2,085,178	122,658	2,272,719	133,689	2,346,820	138,048
Management	930,379	84,580	1,944,399	81,017	2,229,679	85,757	2,514,849	89,816
Non-unionized	764,377	69,489	2,442,247	76,320	2,848,270	76,980	3,381,046	82,465
Unionized	7,065,045	62,523	10,190,527	57,901	10,512,692	57,446	11,049,853	61,049
Total	9,166,338		16,662,352		17,863,360		19,292,568	

Total FTE's and Employee Compensation Allocated to EWU for 2006 - 2009

Number of Employees/Full-Time Equivalents

	2006		2007	2008	2009
Executive	3		9	9	9
Management	11		18	19	20
Non-unionized	11		22	25	28
Unionized	113		141	146	147
Total	138		189	198	204

Employee Compensation (Wages/Salaries)

	2006		2007		2008		2009	
	Total	Average	Total	Average	Total	Average	Total	Average
Executive	406,537	135,512	1,014,118	114,719	1,171,321	131,314	1,220,885	135,654
Management	930,379	84,580	1,413,648	80,184	1,635,068	86,972	1,830,148	90,691
Non-unionized	764,377	69,489	1,581,875	72,931	1,891,894	75,797	2,235,848	81,068
Unionized	7,065,045	62,523	8,530,640	60,621	8,623,094	59,241	9,195,285	62,570
Total	9,166,338		12,540,281		13,321,377		14,482,166	

Total FTE's and Employee Compensation Allocated to Affiliates for 2006 - 2009

Number of Employees/Full-Time Equivalents

	2006		2007	2008	2009
Executive			8	8	8
Management			6	7	8
Non-unionized			10	12	13
Unionized			35	37	34
Total			60	65	63

Employee Compensation (Wages/Salaries)

	2006		2007		2008		2009	
	Total	Average	Total	Average	Total	Average	Total	Average
Executive			1,071,060	131,257	1,101,398	136,312	1,125,935	140,742
Management			530,751	83,320	594,611	82,585	684,701	87,558
Non-unionized			860,373	83,450	956,376	79,433	1,145,198	85,335
Unionized			1,659,888	47,049	1,889,598	50,470	1,854,568	54,482
Total	-		4,122,071		4,541,983		4,810,401	

SEC\_IRR\_31

**2007 Purchased Services & Products - OM&A\***  
**Ten Largest Suppliers with the Total Amount Paid**

<b>Vendor</b>	<b>Activity</b>	<b>Priced by</b>	
CANADA POST CORPORATION	Postage	Single Source	
M.E.T. UTILITIES MANAGEMENT LTD	Meter Reading	RFP/RFQ	
MOTOROLA CANADA LIMITED	Software Maintenance	RFP/RFQ/Market	
GE CAPITAL	Vehicle Leasing	RFP/RFQ	
FOSS NATIONAL LEASING	Vehicle Leasing	RFP/RFQ	
BELL CANADA	Telephone Services	Market	
ENWIN UTILITIES LTD	Utilities	Single Source/Regulated	
ONTARIO LINE CLEARING & TREESERVICES LTD	Tree Trimming	RFP/RFQ	
PETROLINE PETROLEUMS	Fuel	RFP/RFQ	
KELLY SERVICES (CANADA) LTD.	Temporary Services	RFP/RFQ	
		<b>TOTAL</b>	<b><u>\$3,844,860</u></b>

**2008 Purchased Services & Products to July 31 - OM&A\***  
**Ten Largest Suppliers with the Total Amount Paid**

<b>Vendor</b>	<b>Activity</b>	<b>Priced by</b>	
CANADA POST CORPORATION	Postage	Single Source	
GE CAPITAL	Vehicle Leasing	RFP/RFQ	
LANDGRAFF TREE SERVICE	Tree Trimming	RFP/RFQ	
FOSS NATIONAL LEASING	Vehicle Leasing	RFP/RFQ	
FOREST GLADE TREE EXPERTS	Tree Trimming	RFP/RFQ	
M.E.T. UTILITIES MANAGEMENT LTD	Meter Reading	RFP/RFQ	
STERLING MARINE FUELS	Diesel	RFP/RFQ	
PETROLINE PETROLEUMS	Fuel	RFP/RFQ	
SPRINGBOARD MANAGEMENT INC	Consulting Services	Market	
ENWIN UTILITIES LTD	Utilities	Single Source/Regulated	
	<b>TOTAL</b>		<b><u>\$2,276,494</u></b>

**2007 Purchased Services & Products - OM&A\***

All Suppliers Listed as "Consulting" or any Variation - Total Dollar Amount

Vendor	Activity	Priced by
SPRINGBOARD MANAGEMENT INC	Consulting Services	Market
MILLER,CANFIELD,PADDOCK AND STONE LLP	Consulting - Legal	RFP/RFQ
KPMG LLP	Consulting Services	RFP/RFQ
BORDEN, LADNER, GERVAIS, LLP	Consulting - Legal	Market
MCTAGUE LAW FIRM LLP	Consulting - Legal	RFP/RFQ
OGILVY RENAULT LLP/ S.E.N.C.R.L.	Consulting - Legal	RFP/RFQ
MOUSSEAU, DELUCA, MCPHERSON, PRINCE	Consulting - Legal	RFP/RFQ
RICK D. LAMKIE & ASSOCIATES	Consulting Services	Market
DUCHARME, MCMILLEN & ASSOCIATES CANADA	Consulting Services	RFP/RFQ
LOVAS STANLEY/RAY & BERNDTSON INC.	Consulting Services	Market
KINECTRICS INC	Consulting Services	RFP/RFQ
GOLDER ASSOCIATES LTD	Consulting Services	RFP/RFQ
LORNE M. CURTIS	WSIB Consulting	Market
DELOITTE & TOUCHE	Consulting Services	RFP/RFQ
SIMUL CORPORATION	Consulting Services	RFP/RFQ
LEGAL WATCH LIMITED	Consulting Services	Market
DIGITAL BOUNDARY GROUP	Consulting Services	RFP/RFQ
QUASAR	Consulting - Audit	RFP/RFQ
Roth Mosey & Partners LLP	Consulting Services	RFP/RFQ
ELENCHUS RESEARCH ASSOCIATES	Consulting Services	RFP/RFQ
	<b>TOTAL</b>	<b>\$1,070,690</b>

# **2008 Purchased Services & Products to July 31 - OM&A\***

All Suppliers Listed as "Consulting" or any Variation - Total Dollar Amount

Vendor	Activity	Priced by	2008 Dollars
SPRINGBOARD MANAGEMENT INC	Consulting Services	Market	\$172,775
MILLER,CANFIELD,PADDOCK AND STONE LLP	Consulting - Legal	RFP/RFQ	\$71,139
MCTAGUE LAW FIRM LLP	Consulting - Legal	RFP/RFQ	\$64,388
OGILVY RENAULT LLP/ S.E.N.C.R.L.	Consulting - Legal	RFP/RFQ	\$53,701
DUCHARME, MCMILLEN & ASSOCIATES CANADA	Consulting Services	RFP/RFQ	\$39,000
KPMG LLP	Consulting Services	RFP/RFQ	\$25,013
LORNE M. CURTIS	WSIB Consulting	RFP/RFQ	\$19,670
BDR NORTH AMERICA INC	Consulting Services	RFP/RFQ	\$17,921
LEGAL WATCH LIMITED	Consulting Services	Market	\$17,367
MOUSSEAU, DELUCA, MCPHERSON, PRINCE	Consulting - Legal	RFP/RFQ	\$14,997
LOVAS STANLEY/RAY & BERNDTSON INC.	Consulting Services	Market	\$14,969
DELOITTE & TOUCHE	Consulting Services	RFP/RFQ	\$11,921
ELENCHUS RESEARCH ASSOCIATES	Consulting Services	Market	\$11,597
ECKLER PARTNERS LTD.	Consulting Services	Market	\$11,456
GOLDER ASSOCIATES LTD	Consulting Services	RFP/RFQ	\$11,374
AIRD & BERLIS LLP	Consulting - Field Work	RFP/RFQ	\$11,244
SHIBLEY RIGHTON LLP	Consulting Services	RFP/RFQ	\$5,164
<b>TOTAL</b>			<b>\$573,696</b>



SEC\_IRR\_33A-1

# Purchase Order

787 QUELLEITE AVENUE  
WINDSOR ON N9A 5T7  
CANADA

Vendor: 9500007728  
BDR NORTH AMERICA INC  
34 KING STREET EAST  
SUITE 1000, 10TH FLOOR  
TORONTO ON M5C 2X8  
CANADA  
Fax: ( ) 416-814-1643

Purchase Order	Date	Revision	Page
EWL-000014145	02/12/2006		1
Payment Terms	Freight Terms	Ship Via	
NET 30	WINDSOR, ONTARIO	COURIER	
Buyer: Patterson, Ken	Currency Code: CAD		

Ship To: 4545 RHODES DRIVE  
WINDSOR ON N9A 5T7  
CANADA

Bill To: 787 QUELLEITE AVENUE  
WINDSOR ON N9A 5T7  
CANADA

Tax Exempt? N	Tax Exempt ID:	Quantity	UOM	PO Price	Extended Amt	Due Date
Line	Schd	Item	Description			

1 - 1

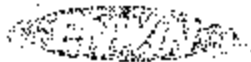
TO COVER THE COST OF ALL SERVICES AND EXPENSES TO REVIEW AND REPORT ON ITS AFFILIATE COSTS AND REVENUES AND TRANSFER PRICING ARRANGEMENTS. YOUR WRITTEN REPORT WILL DOCUMENT REVIEW OF COST ALLOCATION AND TRANSFER PRICING IN ACCORDANCE WITH THE TERMS OF REFERENCE AND AGREEMENT FOR SERVICES INCLUDED HEREWITH. THE TERMS OF REFERENCE AND AGREEMENT FOR SERVICES ARE CONSIDERED PART OF THE PURCHASE CONTRACT AS IF THEY WERE WRITTEN AT LENGTH ON THE FACE OF THIS PURCHASE ORDER. IT IS UNDERSTOOD SERVICES WILL BE BILLED AT THE RATE OF \$2000 PER HOUR FOR THE ASSIGNMENT AND THE PURCHASE ORDER VALUE IS A MAXIMUM, NOT TO EXCEED AMOUNT. KILLOMETRAGE AT \$0.40 PER KILLOMETRE IS CHARGEABLE FOR TRAVEL TORONTO TO WINDSOR, INCLUDED IN THE PO AMOUNT IS A VISIT TO WINDSOR AT AN ESTIMATED COST OF \$2000 FOR TWO PERSONS. IT IS ALSO UNDERSTOOD, IF NECESSARY, PAULA ZAHNETT IS WILLING TO APPEAR AS A WITNESS IN REGULATORY PROCEEDINGS BEFORE THE ONTARIO ENERGY BOARD. RATE FOR THIS SERVICE IS \$2000 PER HOUR.

COMPLIANCE WITH THE FOLLOWING LISTED SECTIONS OF THE ENWINDUC QUOTATION AND PURCHASE ORDER GENERAL CONDITIONS IS REQUIRED FOR THIS SERVICE. THE SECTIONS

Tax Code: GST

Item Total

01/30/2006



0000007228

# Purchase Order

787 QUELLETTE AVENUE  
WINDSOR ON N9A 5T7  
CANADA

Vendor: 0000007228  
BOR NORTH AMERICA INC  
34 KING STREET EAST  
SUITE 1000, 10TH FLOOR  
TORONTO ON M5C 2X3  
CANADA  
Fax: (416) 214-1643

Purchase Order	Date	Revision	Page
EWITL 0000014145	02/12/2008		2
Payment Terms	Freight Terms	Ship Via	
NET 30	WINDSOR, ONTARIO	COURIER	
Buyer	Currency Code		CAD
Patterson, Ken			

Ship To: 4545 RHODES DRIVE  
WINDSOR ON N9A 5T7  
CANADA

Bill To: 787 QUELLETTE AVENUE  
WINDSOR ON N9A 5T7  
CANADA

Tax Exempt? N		Tax Exempt ID:				
Line	Chcd	Item	Description	Quantity	UOM	PO Price
			REFERENCED BELOW ARE CONSIDERED PART OF THE RFQ DOCUMENT AS IF THEY WERE WRITTEN AT LENGTH ON THE FACE OF THE REQUEST FOR QUOTATION: SECTION 4.6.17 PAGES 1 AND 2, SECTION 4.8.18 PAGES 1, 2, AND 3. COMPLIANCE WITH THE VENDOR LETTER DATED 2006 01 17 IS REQUIRED. ENWIN/WUC STANDARD TERMS AND CONDITIONS APPLY TO THIS REQUEST FOR QUOTATION/PROPOSAL/ PROPOSAL ISSUED, AND NO ACCEPTANCE, CONFIRMATION, OR SUBMISSION IN RESPONSE TO THIS REQUEST FOR QUOTATION/PROPOSAL MAY INTRODUCE ANY ADDITIONAL TERMS BETWEEN THE PARTIES, WHETHER IN CONFLICT OR NOT WITH THE ENWIN/WUC STANDARD TERMS AND CONDITIONS. ALL OF THE TERMS AND CONDITIONS ARE SIGNIFICANT, PARTICULARLY THOSE CLAUSES RELATING TO ARBITRATION, LIMITATION AND JURISDICTION. ENWIN/WUC MAY, IN ITS SOLE AND ABSOLUTE DISCRETION, WAIVE ANY IRREGULARITY, THE CURRENT ENWIN/WUC VENDOR INFORMATION AND GENERAL TERMS AND CONDITIONS MAY BE VIEWED ON OUR WEBSITE, <a href="http://www.enwin.com">www.enwin.com</a> vendors Acrobat Reader 5.0 is required. IMPORTANT TERMS AND CONDITIONS OF QUOTATIONS AND PURCHASES ARE CONTAINED ON WEBSITE. VENDORS ARE EXPECTED TO COMPLY WITH THE INFORMATION AND REQUIREMENTS CONTAINED IN THE GENERAL TERMS AND			
						Extended Amt
						Due Date

# Purchase Order

787 QUELLETTE AVENUE  
WINDSOR ON N9A 5T7  
CANADA

Vendor: 0000007228  
BDR NORTH AMERICA INC  
34 KING STREET EAST  
SUITE 1000, 10TH FLOOR  
TORONTO ON M5G 2X8  
CANADA  
Fax: ( ) 416-214-1643

<u>Purchase Order</u>	<u>Date</u>	<u>Revision</u>	<u>Page</u>
EW 11 0000014140	02/19/2008		3
<u>Payment Terms</u>	<u>Freight Terms</u>	<u>Ship Via</u>	
NET 30	WINDSOR, ONTARIO	COURIER	
<u>Buyer</u>	<u>Paterson</u>	<u>Xen</u>	<u>Currency Code</u>
			CAD

Ship To: 4545 RHODES DRIVE  
WINDSOR ON N9A 5T7  
CANADA

Bill To: 787 QUELLETTE AVENUE  
WINDSOR ON N9A 5T7  
CANADA

Tax Exempt? N  
Line Schd Item

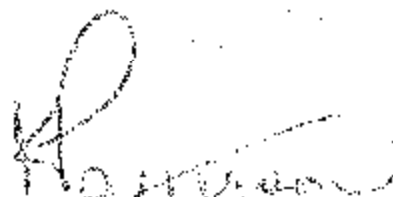
Tax Exempt ID:  
Description

CONDITIONS, QUESTIONS  
MAY BE DIRECTED TO EXWIN  
PURCHASING, 819-251-7300  
X222.

Quantity UOM PO Price Extended Amt Due Date

Total PO Amount

[REDACTED]



Authorized Signature

## CONSULTING AGREEMENT

THIS AGREEMENT is dated as of the 21st day of February, 2008.

BETWEEN

EnWin Utilities Ltd.,  
(the "Client")

- and -

BLR North America Inc.  
(the "Consultant")

WHEREAS the Client desires to engage the Consultant to provide services to the Client for the term of this Agreement and the Consultant has agreed to provide such services, all in consideration and upon the terms and conditions contained herein;

NOW THEREFORE it is hereby agreed as follows:

### 1. Services

The Client agrees to engage the Consultant to provide the services described in the document titled "Proposal for Affiliate Study Quote Number 0000005958", dated January 28, 2008, attached hereto as Schedule "A", and the Consultant has agreed to perform and provide such services (the "Services").

### 2. Term

Except as otherwise provided in this Agreement, the Client agrees to engage the Consultant to provide the Services for a term commencing *February 21<sup>st</sup>, 2008* and ending *October 31<sup>st</sup>, 2008*. Should the Consultant provide Services at the request of the Client beyond the end of the initial term of the Agreement, the term of this Agreement shall be renewed for an additional term as agreed.

### 3. Fees

The Client agrees to pay the Consultant fees for the Affiliate Report Phase of the Services provided by the Consultant under this Agreement at the rate of ~~\$250~~ per hour, to a maximum of

such that the total cost to the Client (fees plus out-of-pocket expenses) does not exceed \$10,000. The Client agrees to pay the Consultant fees for the Expert Witness Phase of the Services as defined at that time, at a rate of \$500 per hour, up to such maximum as may be mutually agreed.

The Client also agrees to reimburse eligible out-of-pocket expenses of the Consultant incurred in connection with the Services. Such expenses shall include travel costs incurred at the request of the Client, including \$100 per km for use of private vehicle, and parking costs incurred to make such vehicle available.

The Consultant agrees to render an invoice to the Client detailing the Services performed by the Consultant and also detailing the out-of-pocket expenses for which the Consultant is eligible to be reimbursed.

The fees paid to the Consultant under this Agreement shall be increased to take into account any applicable Goods and Services Taxes (GST) payable in respect of such fees, and all invoices provided by the Consultant shall include the GST registration number of the Consultant.

#### 4. Independent Contractor

The Consultant's relationship with the Client as entered by this Agreement is that of an independent contractor for all purposes. It is intended that the Consultant shall have general control and direction over the manner in which its services are to be provided to the Client under this Agreement. Nothing contained in this Agreement shall be regarded or construed as creating any relationship (whether by way of employer/employee, agency, joint venture, or partnership) between the parties other than as one involving an independent contractor as provided herein.

#### 5. Authority

The Consultant acknowledges that it is being retained as a consultant to the Client and that as such it does not have the authority to, and cannot, commit or bind the Client to any matter contract or negotiation without the prior written authorization of the Client.

#### 6. Key Persons

The parties acknowledge that Paula Zaman, Neil Wingar and Trent Worsone are Key Persons of the Consultant, and such persons are integral to the successful performance of the Services by the Consultant under this Agreement. It is acknowledged by the Consultant that the Key Persons will perform the Services, unless the Client otherwise consents in writing.

**7. Conflict of Interest**

The Consultant will not engage in any activity or provide any services to others, where such activity or the provision of such services creates a conflict of interest with the provision of the Services to be provided pursuant to this Agreement.

Subject to the above, the Consultant will be free to perform consulting and other services to the Consultant's other clients during the term of this Agreement.

**8. Use and Distribution of Deliverables**

As part of the Services, deliverables may be provided by the Consultant to the Client in the form of reports and analysis spreadsheets. All deliverables are provided for the Client's use in any manner that the Client deems appropriate. Copies of the written reports in hard form may be distributed by the Client to any party at the discretion of the Client, provided that corporate logos or other identifiers of the Consultant's authorship shall not be removed.

Any spreadsheets originated by the Consultant as part of the Services will on request be provided to the Client in their electronic form for inspection and use by the Client's staff. The Client may print and distribute hard copies of the spreadsheet analysis to any party at its discretion, provided that acknowledgment of the Consultant as the developer is included.

The Client is granted an exclusive license to use the analysis spreadsheets, reports and other deliverables as delivered by the Consultant, in the original form or as subsequently altered by the Client, in perpetuity, in consideration of the fees paid for this assignment. However, the Client shall not transfer the original, copied or altered electronic form of the spreadsheets to any other party, or give access thereto in the Client's own offices or on the Client's computers, without the express written consent of the Consultant. Should access to the electronic form of the spreadsheets, whether original or altered, be required as part of a legal or regulatory process, the Consultant undertakes to provide written consent.

**9. Use of Pre-Existing Analysis Tools of the Consultant**

In the course of the assignment, the Consultant may make use of analysis spreadsheet models which are already in existence at the date of this Agreement, and which were not developed at the expense of the Client. The Consultant retains all rights to such pre-existing tools and to the methodology, knowledge and data contained therein. No fee shall be charged to the Client for use of such tools in the assignment, except that the normal hourly rates will be charged for any work necessary to input updated or Client-specific information, evaluate results, or make modifications as appropriate to the assignment. Such tools shall continue to be considered as pre-

existing analysis tools of the Consultant, and shall not become deliverables of the assignment, notwithstanding any updates or modification made at the expense of the Client during the course of the assignment.

The Consultant will at the Client's request make available its pre-existing analysis tools, in their electronic form, for inspection by the Client during the assignment. During the assignment, the Client shall exercise due diligence in protecting the confidentiality of the Consultant's pre-existing analysis tools. The Client shall not transfer the original, copied or shared electronic form of the spreadsheets to any other party, or give access thereto in the Client's own offices or on the Client's computers. On termination of the assignment, the Client undertakes to delete all existing copies of the pre-existing analysis tools from its computers. The Client shall not provide to any other party, without the Consultant's written consent, printed hard copies of the Consultant's pre-existing analysis tools, other than summary output tables specifically provided by the Consultant and designated by the Consultant as deliverables of the assignment.

#### **10. Confidential Information of the Client**

The Consultant shall keep confidential all proprietary information of the Client, including, without limitation, all unpublished business and technical information, papers or records, however produced. These obligations shall survive completion and/or termination of this Agreement, and shall apply until the earlier of: (a) the date on which the information is disclosed or made public by any party other than the Consultant; or (b) three years from the date of the last invoice submitted by the Consultant hereunder.

#### **11. Termination**

In the event that the Consultant fails to perform the Services in accordance with the terms of this Agreement or otherwise breaches this Agreement, and such failure or other breach continues for a period of five (5) days after receipt by the Consultant of written notice from the Client alleging same, the Client may terminate this Agreement by written notice, to take effect immediately.

Upon termination of this Agreement:

- a) The Client's obligations to the Consultant under this Agreement shall terminate except for the Client's obligation to pay any fees and expenses in accordance with the terms of this Agreement, to the date of termination; and
- b) The Consultant's obligations to the Client under this Agreement shall terminate, except any obligations that are specifically expressed to survive the termination of this Agreement.

#### **12. Indemnification**



The Consultant will, subject to the limitations set out below, hold the Client harmless from all direct damages, costs and expenses suffered or incurred by the Client, arising from any breach of this Agreement or any negligent act, error or omission by the Consultant in the performance of the Agreement.

The Consultant will have no personal liability to the Client, however arising and the Client will bring no claim or action against the Consultant in their personal capacity, other than actions arising out of breach or alleged breach by the Consultant pursuant to the confidentiality provisions which are part of this Agreement or part of any separate agreement made in respect of the Services.

The liability of the Consultant to the Client, however arising, will be absolutely limited to claims brought within 12 months of the completion of the Services, and be absolutely limited to the amount of professional fees for the Services payable to the Consultant, unless the Client shall show that its losses were caused by willful misconduct on the part of the Consultant, in which case the foregoing shall not apply.

In connection with claims initiated by third parties against the Client where the Client claims even against the Consultant, the Client will indemnify and hold harmless the Consultant from and against all claims, damages, costs and expenses of whatever kind or character arising or alleged to arise out of the Services or the acts or omissions of others.

### 13. Governing Law

This Agreement shall be governed by the laws of the Province of Ontario and the federal laws of Canada applicable therein.

### 14. Notices

All notices required or permitted under this Agreement shall be provided in writing to the relevant party at the applicable address as follows:

a) If to the Client:

Email:

Fax:

Kenneth F. Patterson, Director, Purchasing Services  
EnWave Utilities Ltd.  
6747 Rhodes Drive, 1<sup>st</sup> Floor  
Windsor, Ontario, N9W 5J1  
kp.patterson@enw.ca  
519 751 1996

to the Consultant

BDR North America Inc.  
Attn: Paula Zarnett, Vice President  
Suite 1000, 34 King St East  
Toronto, Ontario  
M5C 1X8  
E-mail: pzarnett@BDRenergy.com  
Fax: 416-214-6225

IN WITNESS WHEREOF the parties hereto have signed this Agreement as of the day and year first above written.

EnViro Utilities Ltd.

BDR North America Inc.

Per:



Name: **KEN PATTERSON**

Title: **DIRECTOR, PURCHASING SERVICES**

Per:



Paula Zarnett

Vice President

SEC\_IRR\_33A-2



# Request for Quotation

Request Quote No.	Date	Buyer	Page
WU01-060008958	12/3/2003	Customer	1
Payment Terms	Base Price Quote (USD)	Closing	
Net 30	01/09/2004 01:00:00 PM	01/30/2004 11:50:00 AM	

787 OUELLETTE AVENUE  
WINDSOR ON N9A 5T7  
CANADA

Ship To: 4545 RHODES DRIVE  
WINDSOR ON N9A 5T7  
CANADA

Line Item	DESCRIPTION	Quantity	Unit	Unit Price	Amount
1	<p>ENWIN UTILITIES LTD. ("ENWIN") REQUESTS THE SERVICES OF AN INDEPENDENT THIRD PARTY CONSULTANT TO REVIEW AND REPORT ON ITS AFFILIATE COSTS AND REVENUES AND TRANSFER PRICING ARRANGEMENTS. YOU ARE INVITED TO SUBMIT A WRITTEN PROPOSAL TO PROVIDE THE SERVICES REQUESTED IN THE DOCUMENT REVIEW OF COST ALLOCATION AND TRANSFER PRICING INCLUDED HERETO.</p> <p>QUESTIONS MAY BE DIRECTED TO ANDREW SASSO, DIRECTOR REGULATORY AFFAIRS. PLEASE SEE PARAGRAPH 9 FOR CONTACT DETAILS.</p> <p>LEADING SHIPPING DATE AND TIME SHOULD BE CONSIDERED BY SUPPLIERS TO MEET CLOSING REQUIREMENTS. QUOTATIONS RECEIVED IN THE PURCHASING OFFICE AFTER SHIPMENT DUE DATE AND TIME, REGARDLESS OF MARKINGS, WILL BE RETURNED UNOPENED.</p> <p>RETURN SUBMISSIONS SEALED IN YOUR ENVELOPE, MARK QUOTATION NUMBER BOLDLY ON THE OUTSIDE OF YOUR ENVELOPE.</p> <p>SUBMIT QUOTATION TO: PURCHASING OFFICE, ENWIN UTILITIES LTD. 4545 RHODES DRIVE, 1ST FLOOR P.O. BOX 1873 WINDSOR, ONTARIO N9A 5T7</p> <p>COMPLIANCE WITH THE FOLLOWING LISTED SECTIONS OF THE ENWINWU QUOTATION AND PURCHASE ORDER GENERAL CONDITIONS IS REQUIRED FOR THIS REQUEST. THE SECTIONS REFERENCED BELOW ARE CONSIDERED PART OF THE RFQ DOCUMENT AS IF THEY WERE WRITTEN AT LENGTH ON THE FACT OF THE REQUEST FOR QUOTATION. SECTION 4.6.1, PAGES 1 AND 2, SECTION 4.6.2, PAGES 1, 2, AND 3, COMPLIANCE WITH THE VENDOR LETTER DATED 709 0117 IS REQUIRED.</p> <p>ENWINWU STANDARD TERMS AND CONDITIONS APPLY TO THIS REQUEST FOR QUOTATION/STANDARD PROPOSAL ISSUED, AND NO ACCEPTANCE, CONFIRMATION, OR</p>	1.00	1A		

## Request for Quotation

787 QUELLETTE AVENUE  
WINDSOR ON N9A 5L7  
CANADA

Line	Item	Description	Quantity	UM	Unit Price	Amount
<p>SUBMISSION IN RESPONSE TO THIS REQUEST FOR QUOTATION/PROPOSAL MAY INTRODUCE ANY ADDITIONAL TERMS. BETWEEN THE PARTIES, WHETHER IN CONNECTION WITH THE ENWIN WDC STANDARD TERMS AND CONDITIONS, ALL OF THE TERMS AND CONDITIONS ARE SIGNIFICANT, PARTICULARLY THOSE CLAUSES RELATING TO ARBITRATION, LIMITATION AND JURISDICTION.</p> <p>ENWIN WDC MAY, IN ITS SOLE AND ABSOLUTE DISCRETION, WAIVE ANY INFORMALITY OR IRREGULARITY, IT OR CURRENT ENWIN WDC VENDOR INFORMATION AND GENERAL TERMS AND CONDITIONS MAY BE VIEWED ON OUR WEBSITE, <a href="http://WWW.ENWIN.COM">WWW.ENWIN.COM</a>. VENDORS' MERCHANT READERS ARE REQUIRED. IMPORTANT TERMS AND CONDITIONS OF QUOTATIONS AND PURCHASES ARE CONTAINED ON WEBSITE. VENDORS ARE EXPECTED TO COMPLY WITH THE INFORMATION AND REQUIREMENTS CONTAINED IN THE GENERAL TERMS AND CONDITIONS. QUESTIONS MAY BE DIRECTED TO ENWIN PURCHASING, 519-251-0300 X735.</p>						

## **REVIEW OF COST ALLOCATION AND TRANSFER PRICING**

### **TERMS OF REFERENCE**

EnWin Utilities Ltd. ("EnWin") requires the services of an independent third party consultant to review and report on its affiliate costs and revenues and transfer pricing arrangements.

#### **1. Introduction**

EnWin is an Ontario corporation located in the City of Windsor. EnWin carries on the business of owning and operating electricity distribution facilities in Windsor.

EnWin is regulated by the Ontario Energy Board ("OEB"). EnWin must submit an application to the OEB for approval and establishment of a revenue requirement and associated rates.

EnWin's affiliates are: the City of Windsor, Windsor Canada Utilities Ltd., the Windsor Utilities Commission, and EnWin Energy Ltd.

#### **2. Background**

In 2005, EnWin submitted a 2005 Electricity Distribution Rate Application with the OEB to establish a revenue requirement. As a part of the process, EnWin engaged in several settlement issues with OEB technical staff, and other intervenors. As a part of the settlement, EnWin made a commitment to conduct a study and prepare a report related to accuracy and prudence of its affiliate costs and revenues and transfer pricing arrangements (the "Affiliate Report"). The Affiliate Report is to be completed and filed with the OEB and intervenors as part of EnWin's 2009 distribution rate application.

#### **3. Scope of Work**

EnWin requires the services of a consulting firm to conduct and complete the Affiliate Report.

The consultant's scope of work will include the following:

- 1) The consultant will review the transfer pricing arrangement between EnWin and its affiliates, and develop an opinion on the appropriateness of the transfer pricing arrangements.
- 2) The consultant will review the costs charged to and by EnWin in respect of its affiliates and develop an opinion on the appropriateness of those costs.
- 3) The consultant will deliver a draft report in writing and by presentation to EnWin regarding the opinions in (1) and (2). The report shall include the following:
  - a. A description of each of the services provided to and by each affiliate,
  - b. Comments on the accuracy and fairness of the allocation of costs, and
  - c. Suggested changes to improve the fairness or accuracy of the costs.

- 4) The consultant will deliver a final report in writing and by presentation to EnWin regarding and including the matters set out in (3).

#### **4. Proposal Requirements**

The consultant's submission must not exceed 10 pages in length (excluding appendices) and must include the following

- A paragraph that demonstrates a clear understanding of the requirements and objectives of the project.
- An overview of the consultant firm, including experience as related to this project and the industry.
- For the individual(s) assigned to carry out this work, a resume of their qualifications and experience as related to this project and the industry.
- A summary of previous projects of a similar nature successfully completed by the consultant. References should be provided.
- A detailed description of the proposed approach and methodology.
- A detailed work plan and project schedule showing the number of person days expected to be spent on the review and report preparation.
- A study budget that includes the number of days and per diem rates for the individual and associated costs including but not limited to technical fees, travel, printing, etc.
- An indication of the consultant's availability to complete the required work during the period of March 3, 2008 to April 30, 2008.
- An indication of the consultant's willingness to appear as an expert witness in proceedings of the Ontario Energy Board, related to the Affiliate Report.
- An expert witness budget that includes the per diem rates for the individual and associated costs including but not limited to preparation, attendance, technical fees, travel, printing, etc.
- A proposed agreement for services.

#### **5. Budget**

The total budget for this project should not exceed \$20,000 including all expenses and taxes.

#### **6. Timing**

It is expected that it will take the consultant 2-3 weeks to prepare the Affiliate Report. It is expected that the Affiliate Report will be completed by April 30, 2008.

#### **7. Receiving of Proposals**

Four (4) copies of the consultant's proposal must be received no later than 11:30:59 a.m. U.S.T., January 30, 2008. Late submissions will be returned unopened. Proposals shall be sealed, addressed to:

Purchasing Department  
EnWin Utilities Ltd.  
4545 Rhodes Drive 1<sup>st</sup> floor

Windsor, ON N8W 5T1

Please follow the instructions detailed in RFP document. Questions concerning receiving proposals may be directed to the Purchasing Department 519-251-7300 ext 239.

Consultants should be prepared to attend an interview, in person or by teleconference, on a date to be determined if deemed necessary to finalize the selection process.

No payment will be made for the preparation and submission of proposals or attendance at an interview.

#### **8. Client and Consultant Agreement**

The successful consultant will enter into an agreement for services with EnWin. The agreement will conform to the terms of the EnWin Performance Standards & Retainer Agreement, a copy of which is enclosed as Appendix A.

EnWin shall have the right at any time to cancel the agreement in whole or in part without further payment except for those services completed prior to cancellation.

The final report and all other materials produced during the completion of this study will become the property of EnWin. The consultants will be required to obtain written approval prior to releasing any study information to other parties.

#### **9. Communication**

To confirm receipt of this document please sign and return the Quotation Acknowledgement Form included in the RFP documents.

All inquiries concerning this Request for Proposals should be submitted in writing to [asasso@enwin.com](mailto:asasso@enwin.com) or fax: 519-973-7812.

#### **10. Evaluation Process**

The proposals will be evaluated based on the following criteria:

- Understanding of the Project Requirements and Objectives
- Corporate Profile of the Firm
- Project Team
- Relevant Past Experience
- Proposed Approach and Methodology
- Proposed Work Plan and Project Schedule
- Study Budget
- Willingness to Appear as an Expert Witness
- Expert Witness Budget

Short-listed preponents may be invited to make a presentation to provide the selection committee an opportunity to ask additional questions.

#### **11. Schedule**

- a. Distribution of Request for Proposals: January 7, 2008
- b. Proposal Submission Deadline: January 30, 2008
- c. Consultant Interviews (if required): The week of February 11, 2008
- d. Consultant Selection: The week of February 18, 2008



- e. Start Date and Kick-Off Meeting: No later than March 17, 2008
- f. Draft Report Due and Presented: In advance of Final Report
- g. Final Report Due: No later than April 30, 2008

EnWin reserves the right to alter the dates in (a-f).

#### **12. Notification of Results**

Following the completion of the proposal evaluations and confirmation of an approved agreement, all consultants will be advised in writing.

## APPENDIX A

## *EnWin* Performance Standards and Retainer Agreement

One of the primary objectives of *EnWin* is to ensure that it receives high quality, cost-effective legal/consulting services from its outside advisors/consultants (hereinafter referred to as 'consultants'). The following reflects the expectations and requirements of *EnWin* in connection with legal/consultant work performed by outside firms engaged by *EnWin*. Only consultants and/or firms licensed to practice in Ontario will be accepted by *EnWin*. Consultants and/or firms must be members in good standing with their respective Professional Association and compliant with that Association's Code of Ethics at all times. Any legal/consulting firm having questions or concerns should advise *EnWin* before accepting an assignment.

### Policy Statement

The consultant acknowledges that it will undertake *EnWin*'s work only if it has the appropriate level of skill and ability to perform the work in an expert manner. The consultant will act with the utmost good faith, in the best interests of *EnWin* and without any conflict or potential conflict of interest. The consultant recognizes *EnWin*'s requirement that legal/consulting services be provided in an efficient and cost effective manner. The consultant, in consultation with *EnWin*, will appoint a senior officer to act as the 'manager in charge' of the relationship between *EnWin* and the consultant. The manager in charge will meet with representatives of *EnWin*, without cost, from time to time as required to discuss ways to best achieve these goals.

### Fixed Fees

It is *EnWin*'s desire, whenever possible, to have all work performed on a fixed fee basis. All services described in Schedule A shall be performed for a fixed fee as described therein. With respect to any other services, upon receipt of a new matter the consultant will provide *EnWin* with a fixed fee quote. This quote should be in writing and include estimated disbursements. No work on a matter shall commence until *EnWin* approves the fixed fee in writing.

### Budgeting

In any case where *EnWin* and the consultant agree that a fixed fee is inappropriate and it appears likely that fees plus disbursements will exceed \$25,000, the consultant will, at no cost to *EnWin*, submit a budget estimating the fees and disbursements. The budget will include the following details (together with any other information which the consultant feels is appropriate): brief outline of work to be performed; name of each employee/partner/associate (the

"professionals") assigned to the matter; his or her hourly rate (which shall be the lowest rate charged by that professional to any client of the consultant); year of call or accreditation; estimated hours required. The consultant will forthwith advise *EnWin*, without request, if it appears that the budget will be exceeded. The budget shall include the cost of providing a preliminary report on the work to be performed with expected outcomes as well as a written report at the conclusion of the assignment.

#### Staffing

The consultant will assign qualified professionals to do *EnWin*'s work. The consultant will bear in mind the complexity of the matter, expertise of the professionals involved, significance of the matter to *EnWin*, and the need to perform the work in a timely, efficient and cost effective manner. The consultant will not charge *EnWin* for "learning time" or duplication of time. In particular, the consultant will not involve more than one professional in meetings, telephone conferences, or other proceedings unless required. It is also *EnWin*'s position that internal office conferences and reviews of documents, opinions and other material by a number of people, are generally a duplication of time. While maintaining the standards set forth in this Agreement, the consultant will assign the fewest number of professionals possible to any matter or aspect thereof. There will be no changes to the professionals handling a particular matter without prior notice to *EnWin*.

#### Reports

##### (a) Usual Course Reports

The consultant agrees to provide a brief status report quarterly, or more frequently if needed, advising as to what steps were taken during the period covered by the report, results achieved, and what is expected to be done in the following period. In addition, in litigation matters, this report should include an assessment of the likelihood of success, together with the firm's recommendations with regard to settlement and the use of an alternative dispute mechanism in lieu of litigation. A more detailed summary of the work done will be set forth in the time dockets that are to accompany the consultant's accounts (as set out below). This report shall be received by *EnWin* within 20 days of the end of the period to which the report relates.

The consultant agrees to provide the primary *EnWin* contact with notice when 75% of the set contract fee or budget (as the case may be) has been reached.

The consultant agrees to provide copies to *EnWin* of all contracts, significant correspondence, memoranda and other materials; such copies to be in electronic format wherever possible.

(b) Urgent Reports

*EnWin* requires the consultant to immediately notify the primary *EnWin* contact (or delegate) if the consultant becomes aware of any matter that may have a material effect on *EnWin*. By way of example:

-any activity which could result in a criminal or quasi-criminal charge, adverse publicity, or media attention.

Billing

The following is applicable whether the consultant is charging on an hourly rate or fixed fee basis:

(a) Fees:

The account need not contain any detail of the work performed, but should summarize the number of hours and hourly rate of each professional whose work is covered by the account. The account should also identify the total fees and disbursements charged to date on the particular matter (including the account being rendered), the name of *EnWin* employee who retained the consultant. The consultant must also provide with the account its detailed time dockets showing the services performed, the date upon which they were performed, the professional who performed them, the length of time taken for each service, and the fee attributed to the particular service. The Firm understands that *EnWin* will not pay for the following charges without prior approval:

\*Charges to prepare the accounts to *EnWin* and to answer questions relating thereto.

\*Travel time

\*Secretarial time, clerical time, or any other item that is overhead in nature

\*Increases to hourly rates

\*Prior research

\*Opening and organizing the file.

In addition, *EnWin* expects docketing to be in increments no greater than one-tenth of an hour and to accurately reflect the productive time spent.

(b) Disbursements:

Disbursements will be charged at no more than the consultant's cost. In any event, photocopying charges shall not exceed 10 cents per page. Commercial printing services should be used when economical and prudent to do so. There shall be no charge for sending or receiving telefax communications or electronic mail other than the actual cost of long distance charges. Any travel on *EnWin's* business shall be undertaken in the most cost effective fashion taking into account discounts or special rates. Staff meals, staff taxis and any other cost that is overhead in nature shall not be charged to *EnWin*. No first class travel may be undertaken at *EnWin's* expense. The account should reflect the total disbursements charged to date on a particular matter.

(c) Submission and Payment of Accounts:

All accounts should be submitted to the primary *EnWin* contact.

Insurance

The following are particulars of the consultant's errors and omissions coverage: The successful Consultant will be required to provide suitable Certificate(s) of Insurance with this document.

The consultant will notify *EnWin* promptly of any changes in coverage.

\_\_\_\_\_  
Date

\_\_\_\_\_  
consultant

SEC\_IRR\_33C



December 6, 2007

**Ontario Energy Board**  
Suite 2700, P.O. Box 2319  
2300 Yonge Street  
Toronto, Ontario M4P 1E4  
Attention: Board Secretary

**Consumers Council of Canada**  
35 Madison Avenue, Suite 100  
Toronto, Ontario M5R 2S2

**Energy Probe Research Foundation**  
225 Brunswick Avenue  
Toronto, Ontario M5S 2M6

**The School Energy Coalition**  
c/o Shibley Righton LLP  
250 University Avenue, Suite 700  
Toronto, Ontario M5H 3P5

**Vulnerable Energy Consumers Coalition**  
c/o Public Interest Advocacy Centre  
1 Nicholas Street, Suite 1204  
Ottawa, Ontario K1N 7B7

Dear Sir/Madam:

Re: **RP-2005-0200/EH-2005-0359**  
**Settlement Agreement**  
**Affiliate Report**

On February 15, 2006, a Settlement Proposal was filed in respect of the above noted Board proceeding. That Settlement Proposal, attached as Schedule "A", was accepted by the Board and formed part of the Board's Order in the proceeding. Your organization was party to that Settlement Proposal. The settlement of section 2.2 provided, in part, that:

"Prior to filing its next distribution rate application, the Applicant shall conduct a study and prepare a report related to affiliate costs and revenues and transfer pricing arrangements (the "Affiliate Report"). The Affiliate Report shall be provided to the Board and the Intervenor as part of the Applicant's next rate application. The Applicant will undertake a tender for consultant services for the Affiliate Report. The Applicant will contract



the Intervenor in the EDR Application and seek from them input into the issues the Intervenor would like addressed in the Affiliate Report. The Applicant will consider, but will not be required to adopt, the Intervenor's suggestions."

On November 14, 2006, EnWin brought an application to the Board requesting approval under Section 86 (the "MAAD Application") to reorganize the EnWin group of companies. Pursuant to the Board's Decision and Order in EB-2006-0282, dated December 19, 2006, leave was granted for EnWin Powerlines Ltd. to amalgamate with EnWin Utilities Ltd. As was noted in the Board's Decision and Order, one of EnWin's objectives in amalgamating was to address the transfer pricing issues that prompted the request for an Affiliate Report. The companies amalgamated on January 1, 2007.

EnWin intends to file a Cost of Service Application for 2009 rates in August 2008. The 2009 rebasing will allow EnWin to present the new corporate structure using 2007 historical data. The Affiliate Report will form part of EnWin's COS Application.

Accordingly, EnWin will be tendering for a consultant to prepare an Affiliate Report. To satisfy the "input" requirement of the Settlement Agreement, EnWin invites you, as an Intervenor in the above noted proceeding, to provide input into the terms of reference for the Affiliate Report. The proposed terms of reference are enclosed as Schedule "B".

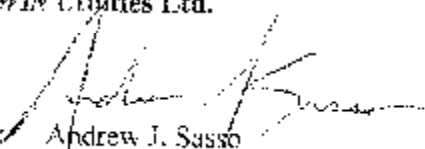
Please provide your input in writing to:

EnWin Utilities Ltd.  
P.O. Box 1625, Stn. 'A'  
787 Quelette Avenue  
Windsor, Ontario N9A 5T7  
Attention: Andrew J. Sasso

Please provide your input no later than **December 22, 2007** in order that the tendering process may begin as soon as possible in January 2008. In the event your organization does not wish to participate in this process, please advise us in writing by the aforementioned date.

Regards,

EnWin Utilities Ltd.

  
Per: Andrew J. Sasso

From the Desk of Andrew J. Sasso, B.Com., LL.B., Director, Regulatory Affairs  
P.O. Box 1625, Stn. "A", 787 Quelette Avenue, Windsor, ON N9A 5T7  
Tel: 519-255-2735 Fax: 519-973-7612 Email: [asasso@enwin.com](mailto:asasso@enwin.com)

SEC\_IRR\_34

## SEC\_IRR\_34

### Monthly Service Charge (1:1 Ratio and Mid-Point of Range)

	Min	Max*	Monthly Service Charge**	% Fixed	Volumetric Rate	kWh	kW	Total Bill Impact (\$)**	Total Bill Impact (%)**
Residential	\$ 4.80	\$ 16.61	\$ 10.71	36.47%	\$ 0.0267	1,000	n/a	\$9.88	9.1%
GS<50	\$ 13.26	\$ 34.42	\$ 23.84	32.96%	\$ 0.0170	2,000	n/a	\$3.12	1.4%
GS>50	\$ 44.39	\$ 104.08	\$ 74.24	9.43%	\$ 3.9154	500,000	1,000	\$161.20	0.4%
Intermediate	\$ 104.66	\$ 276.24	\$ 190.45	1.60%	\$ 2.9749	1,750,000	4,000	\$9,469.53	6.8%
Large Use – Regular	\$ 119.07	\$ 436.25	\$ 277.66	1.38%	\$ 2.6516	7,500,000	10,000	<b>-\$1,401.65</b>	-0.2%
Large Use – 3TS	n/a	n/a	\$ 27,520.81	35.72%	\$ 2.7959	10,000,000	20,000	\$12,011.06	1.5%
Large Use – FA	n/a	n/a	\$ 113,525.59	100.00%	\$ -	7,500,000	10,000	\$10,535.21	1.7%
USL	\$ 0.29	\$ 7.16	\$ 3.73	38.28%	\$ 0.0152	100	n/a	<b>-\$23.75</b>	-65.1%
Sentinel Lighting	\$ 0.02	\$ 8.47	\$ 4.25	22.86%	\$ 51.2345	100	1	\$51.27	353.1%
Street Lighting	\$ 0.01	\$ 8.37	\$ 4.19	45.54%	\$ 28.9193	100	1	\$31.61	273.9%

\* Maximum according to the Board's ranges, exclusive of the Board's exemption for rates currently beyond this level

\*\* Excluding Smart Meter Rate Adder

\*\*\* Including Smart Meter Rate Adder of \$1.00

SEC\_IRR\_36

# SEC\_IRR\_36

	Min	Max	Current Monthly Service Charge*	% Fixed	Proposed Monthly Service Charge**	% Fixed
Residential	\$ 4.80	\$ 16.61	\$ 8.39	36.23%	\$ 12.45	48.44%
GS<50	\$ 13.26	\$ 34.42	\$ 24.11	35.25%	\$ 26.13	35.25%
GS>50	\$ 44.39	\$ 104.08	\$ 323.47	34.94%	\$ 370.81	34.94%
Intermediate	\$ 104.66	\$ 276.24	\$ 432.23	21.54%	\$ 1,780.01	21.54%
Large Use – Regular	\$ 119.07	\$ 436.25	\$ 6,436.04	31.64%	\$ 8,413.97	31.64%
Large Use – 3TS	n/a	n/a	\$ 21,634.48	35.72%	\$ 31,618.60	35.72%
Large Use – FA	n/a	n/a	\$ 100,188.11	100.00%	\$ 107,467.88	100.00%
USL	\$ 0.29	\$ 7.16	\$ 28.60	100.00%	\$ 16.56	100.00%
Sentinel Lighting	\$ 0.02	\$ 8.47	\$ 4.88	100.00%	\$ 11.88	100.00%
Street Lighting	\$ 0.01	\$ 8.37	\$ 1.90	100.00%	\$ 4.29	100.00%

\* Excluding \$0.27 Smart Meter Adder

\*\* Excluding \$1.00 Smart Meter Adder