

**THIRD PARTY REVIEW OF THE LRAM AND SSM APPLICATION**

The Board Guidelines, at s. 7.5, set out the requirement of an independent third party review. Enclosed as Attachment A is the independent third party review conducted by EnerSpectrum Group in respect of the EWU claim for LRAM and SSM recovery. Enclosed as Attachment B are completed Input Assumption Templates for 6 CDM programs, as discussed in the EnerSpectrum Group report.

## **Attachment A**

# EnerSpectrum Group

## Third Party Evaluation

EnWin Utilities Ltd.

Application for Recovery of LRAM and SSM

EB-2008-0227

December 3, 2008

## Summary

## Background

EnerSpectrum Group was engaged by EnWin Utilities Ltd. (EWU) In October 2008 to undertake a third party evaluation of the LDC's Application for Recovery of LRAM and SSM amounts associated with its Third Tranche rates-funded Conservation and Demand Management (CDM) expenditures between 2005 and 2007. This engagement complies with Ontario Energy Board Guidelines for Electricity Distributor Conservation and Demand Management EB-2008-0037 (Guidelines) issued March 28, 2008.

In alignment with OEB Guidelines, EnerSpectrum undertook to:

- Provide an opinion on the cost effectiveness results that are material to the LRAM and SSM amounts proposed;
- Verify the participation levels;
- Confirm that the input assumptions are those posted on the Board's website. Where any input assumptions have changed in previous years, confirm that the input assumptions were implemented consistent with section 7.3;
- Where the distributor has varied from the input assumptions posted on the Board's website, review the reasonableness of the input assumptions used;
- Recommend any forward looking evaluation work to be considered; and,
- Recommend any improvements to the program to enhance program design, performance, and uptake by customers.

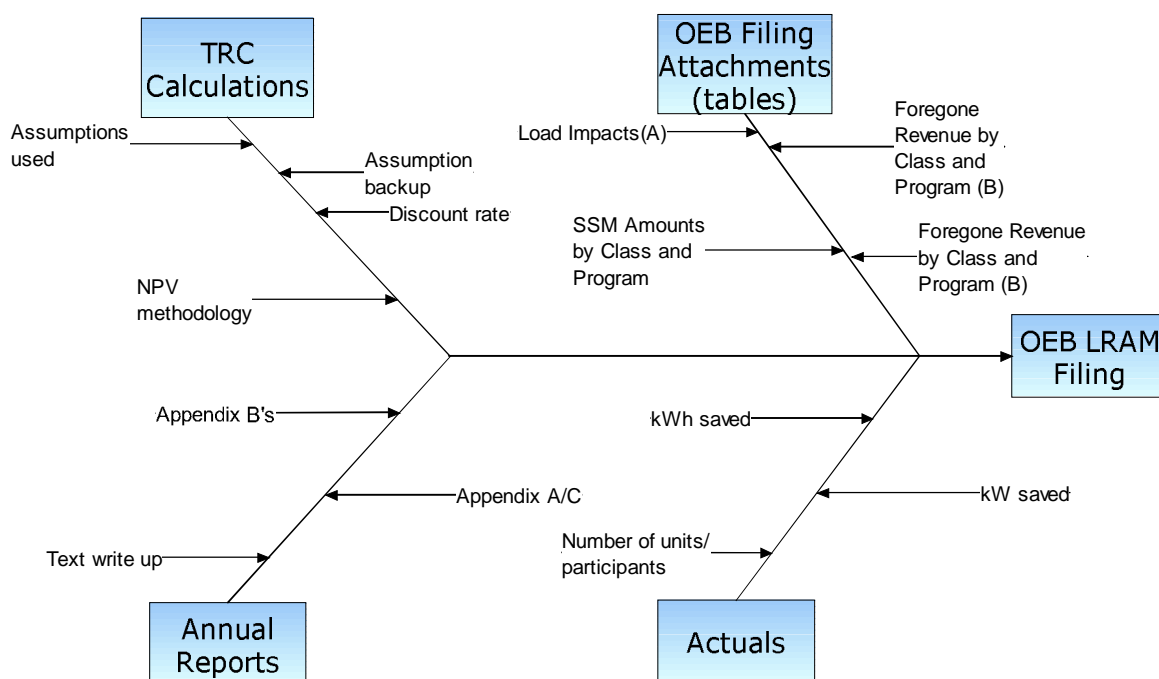
Though funded by EWU, these activities were undertaken by EnerSpectrum Group in compliance with the Guidelines requirement that the third party evaluator "should be independent and serve to protect the interests of ratepayers." EnerSpectrum Group confirms that EWU has provided all information requested by its staff to complete the evaluation, and that EWU made no attempt to influence the findings of this report.

## Evaluation Methodology

### Document Reconciliation

EnerSpectrum Group undertook a preliminary review of EWU's LRAM and SSM submission, and supporting TRC calculations to reconcile all information sources as illustrated in the accompanying list and chart below. The objective was to:

- Ensure Actuals load impacts match OEB Filings
- Ensure Actuals are applied consistently in the TRC, SSM and LRAM calculations
- Reconcile original OEB LRAM and SSM filing and attachments with CDM Annual Report information and calculations



This step was completed to validate a reliable starting point for the analysis to be undertaken and completed. This preliminary assessment revealed no discrepancies among information

currently on file with the OEB (Annual CDM Reports, supporting TRC calculations, and the OEB LRAM SSM filing).

## Analysis

EnerSpectrum Group focused its review and analysis on programs and projects where the magnitude of variances on LRAM and SSM results could potentially be significant. For selected projects, EnerSpectrum Group performed evaluation to affirm the assumptions and values used by EWU in preparing its LRAM and SSM submission.

The analysis was completed by:

- ✓ Validating input assumptions
- ✓ Assessing reasonableness of calculation parameters (starting year, discount rates, durations of savings)
- ✓ Confirming appropriate use of OEB published Assumptions and Measures list
- ✓ Affirming that assumptions and measures that varied from the OEB list are reasonable
- ✓ Testing calculations
- ✓ Identifying variances in results

## Programs Selected for Detailed Evaluation

In its preliminary review of some 31 annual programs and individual projects completed by EWU between 2005 and 2007, EnerSpectrum Group found that most were of the size and scope that any potential variances that might be identified would have immaterial impacts individually on reported LRAM and SSM results.

Five programs/projects were identified where TRC, SSM and LRAM values represented a significant proportion of the total portfolio claim, implying that value differences brought about by changes to input assumptions could have material impact. This led to evaluation of input assumptions, to identify areas where alternatives or variations might be feasible, and, to quantify the resultant impacts on SSM/LRAM claims. Within this context, the prescribed methodology set out above was employed in the following way:

**1. Verify the participation levels**

EnerSpectrum Group confirmed participation and installations came from reliable internal reporting systems of EWU. No audit of the systems themselves was undertaken in this scope of work.

**2. Confirm that the input assumptions are those posted on the Board's website.**

For the majority of programs/projects, EWU used the published OEB assumptions and measures list in its TRC calculations. This includes the appropriate application of avoided costs, free ridership, and energy efficiency technology life. The process of matching the selection of individual measures from the list with the technologies installed in effect determines the resulting TRC value. In some cases, selection of different measures from the OEB list may have been preferable. Those differences were tested, and the change in outcome and impact on TRC, LRAM or SSM was not significant, estimated to be less than \$2,000 for the entire portfolio.

Discount rates applied in TRC calculations were consistent with the approved discount rates for EnWin in each program year, as stated in their submission to the OEB. Generally accepted Net Present Value discounted cash flow analysis was applied to determine the ultimate TRC values for each program included in the LRAM SSM submission.

**3. Where the distributor has varied from the input assumptions posted on the Board's website, review the reasonableness of the input assumptions used**

EnerSpectrum Group found that EWU varied from OEB Input Assumptions and Measures list where a suitable match for the deployed technology could not be found on the list. Where OEB assumptions were not applied, supporting engineering reports, government agency studies (NR Can) and other generally reliable documentation was used to support use of alternative input assumptions.

During the evaluation process, EnerSpectrum Group alerted EWU that completed Input Assumptions Templates must be included with CDM annual report submissions the OEB, under the guidelines, where non-OEB assumptions are used for TRC calculations. As a

result, EWU undertook to complete the required templates for inclusion in a planned supplementary submission related to the EWU rate case.

EWU used tracked actual costs of technology in place of values from the OEB Input Assumptions and Measures list, reflecting great accuracy for incremental costs in TRC calculations.

For all calculations involving input assumptions different from OEB posted values, both benefits and costs were net of free ridership as required in TRC calculations. However, energy and demand savings (kWh and kW) used to calculate LRAM amounts were not net of free ridership. EnerSpectrum Group estimates this impact for all programs/projects to be less than \$7,000 as shown in the table below.

Total Programs	Variance MWh	Variance kW	LRAM Impact
Total	-4,826	-597	-\$6,091

#### **4. Recommend any forward looking evaluation work to be considered.**

Verification of savings from projects that use assumptions outside of the OEB assumptions and measures list would benefit from post-program measurement to reaffirm the validity of non-OEB assumptions.

#### **5. Recommend any improvements to the program to enhance program design, performance, and uptake by customers.**

Recommendations for improvements to individual programs are stated in the Conclusions and Recommendations section of this evaluation report.

## **Selected Programs**

### **Residential**





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EB-2008-0227

1. 2006 CFL Event
2. 2007 Keep Cool/Torchiere Exchange and Porchlight

### GS 50 – 4999 kW

3. 2005 Customer 1
4. 2006 Customer 2

### Large Use - Regular

5. 2007 Customer 3

### Large Use - 3TS

6. 2005 Customer 4

## Evaluation by CDM Program or Project

### • Residential

#### CFL Event

*Distribution of, and incentives for, CFL bulbs, seasonal LED lighting and programmable thermostats at large retail locations. EWU retained the Summerhill Group to perform supporting TRC analysis for this program and the Keep Cool/Torchiere Exchange program.*

To provide an alternative view, EnerSpectrum Group assessed the LRAM/SSM amounts submitted by EWU against results that would be derived by applying the standard OEB Input Assumptions tables with regard to the respective technologies. The resulting TRC value varied from the report value as set out below.

Class	Program	Variance TRC	Variance MWh	Variance kW	SSM Impact	LRAM Impact
Residential	CFL Event	-\$43,688	-1	-573	-\$2,184	-\$23

### Keep Cool/Torchiere Exchange and Porchlight



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EB-2008-0227

*Room air conditioner retirement and halogen torchiere exchange/Volunteers helped deliver energy efficient bulbs door-to-door.*

EnerSpectrum Group used OEB assumptions for technologies implemented as a comparator to the TRC analysis previously reported. The resulting calculations revealed the following:

Class	Program	Variance TRC	Variance MWh	Variance kW	SSM Impact	LRAM Impact
Residential	Keep Cool/Torchiere Exchange and Porchlight	\$59,575	-280	105	\$2,979	-\$9,526

### • GS 50 - 4,999kW

#### Energy Efficiency Projects

*Customer 1*

*Customer 2*

Of the 18 projects undertaken for this class of commercial customer, EnerSpectrum Group identified two projects where alternative assumptions could apply, impacting LRAM and SSM values. The following adjustments were considered:

- Reported kWh reductions were reduced by 30% free ridership for LRAM calculations (Customers 1 and 2).
- A 2007 start date for benefits was applied to the Customer 2 project as an alternative to 2006, resulting in slightly higher TRC and SSM values.

The impacts of these alternatives are shown below.

Class	Program	Variance TRC	Variance MWh	Variance kW	SSM Impact	LRAM Impact
GS 50 - 4,999kW	Customer 1	\$0	-1,408	-161	\$0	-\$533
	Customer 2	\$49,093	-748	-85	\$2,455	-\$283

### Large Use - Regular

2007 Customer 3



## Third Party Evaluation

EnWin Utilities Ltd.  
Application for Recovery of LRAM and SSM  
EB-2008-0227

The following adjustments were considered:

- Reported kWh reductions were reduced by 30% free ridership for LRAM calculations.

Class	Program	Variance TRC	Variance MWh	Variance kW	SSM Impact	LRAM Impact
Large Use - Regular	Customer 3	\$0	-668	-76	\$0	-\$142

### Large Use - 3TS

#### Lighting Retrofit

Large Industrial Customer

- TRC valuation for a 2005 retrofit to T-8 lighting applied a 30% and 10% free ridership rate to kW/kWh and project costs respectively. A three-year technology life was also assumed. As a comparison, EnerSpectrum Group applied a 30% free ridership rate as specified in the OEB CDM guidelines and a five-year technology life aligned with commercial lighting categories in the OEB Input Assumptions table. The resulting calculations produced a significantly higher TRC and SSM, as set out in the table below.

Class	Program	Variance TRC	Variance MWh	Variance kW	SSM Impact	LRAM Impact
Large Use - 3TS	Customer 4	\$150,021	0	0	\$7,501	\$0

## Conclusions and Recommendations

In its review of EWU's LRAM and SSM filing, and the supporting TRC data and calculations from annual CDM reporting, EnerSpectrum Group was able to reconcile all TRC and kW/kWh impacts to ensure submission consistency. This made it possible to verify or complete alternative



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EnWin Utilities Ltd.  
Application for Recovery of LRAM and SSM  
EB-2008-0227

calculations for TRC, LRAM and SSM, and assess the impacts of any variances with those filed in the LRAM and SSM submission.

It should be noted that EWU previously undertook engineering evaluations of custom projects as required by OEB guidelines, the results of which were considered by EnerSpectrum Group in its evaluation. However, EnerSpectrum Group did not undertake an evaluation of the underlying engineering reports themselves, which is considered outside of the scope of the work commissioned.

Overall, EnerSpectrum Group found the EWU LRAM and SSM claim to be within a reasonable range in terms of its accuracy and proximity to alternative results found in some projects through EnerSpectrum Group's evaluation. EWU's SSM submission to the OEB was found to be an accurate representation of the LDC's CDM program costs, benefits, and NPV. Moreover, kW and kWh reductions were consistent with respective input assumptions, resulting in a reliable basis for LRAM calculations. Variations to input assumptions were made for comparative purposes to illustrate outcome sensitivities to a select number of projects deemed to be of the greatest significance to the OEB filing based on their contribution to TRC value. Although quantifiable changes to TRC, LRAM and SSM values for these projects were identified, the impact to aggregated LRAM and SSM represents less than \$300. These results are summarized below:

Class	Program	Variance TRC	Variance MWh	Variance kW	SSM Impact	LRAM Impact
Residential	CFL Event	-\$43,688	-1	-573	-\$2,184	-\$23
	Keep Cool/Torchiere Exchange & Porchlight	\$59,575	-280	105	\$2,979	-\$9,526
GS 50 - 4,999kW	Customer 1	\$0	-1,408	-161	\$0	-\$533
	Customer 2	\$49,093	-748	-85	\$2,455	-\$283
Large Use - Regular	Customer 3	\$0	-668	-76	\$0	-\$142
Large Use - 3TS	Customer 4	\$150,021	0	0	\$7,501	-\$0
Total		\$215,000	-3,105	-790	\$10,750	-\$10,508
Grand Total (SSM+LRAM)		\$242				

## **Recommendations**

- EWU confirmed to EnerSpectrum Group that it had completed documentation for its CDM programs and associated results, and previously engaged KPMG as an external evaluator for its CDM programs. However, the documentation and processes did not integrate LRAM and SSM calculations, requiring EWU to integrate CDM results with LRAM and SSM to provide the necessary information for this evaluation. It is recommended for future CDM programs, that a consolidated mechanism be used to include LRAM and SSM evaluation as part of the CDM results process.
- EWU confirmed to EnerSpectrum Group that engineering assessments were completed on custom projects. It is recommended that follow up be done on these engineering studies to verify that customers have implemented the project as represented, and that the results are accurately represented.

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## **Attachment B**

## Appendix C: Input Assumptions Template

Efficient Technology & Equipment Description
<i>Rebuild of the four compressors and the replacement of two existing regenerative driers with two new variable speed drive refrigerated dryers,</i>
Base Technology & Equipment Description
<i>Existing equipment would continue to operate inefficiently</i>

### Resource Savings Assumptions

Electricity	<i>kW or kWh</i>
<i>Re-gearing of compressors (4) resulted in better air flow at reduced pressure, thereby requiring only three of four compressors to operate – kWh savings = 2,184,000 annually Efficient air drying process and variable speed equipment reduces load of heaters, blowers and purge processes – kWh savings = 309,313 annually Total kWh = 2,493,313</i>	
Natural Gas	<i>m<sup>3</sup> or Btu or CFM</i>
N/A	
Water	<i>L</i>
N/A	

### Other Input Assumptions

Equipment Life	<i>years</i>
15 years	
Incremental Cost	<i>\$/kW or \$/kWh</i>
\$173,713 (gross), \$121,599 (net of free ridership)	
Free Ridership	<i>%</i>
30%	

## Appendix C: Input Assumptions Template

Efficient Technology & Equipment Description
<i>High efficiency transformers</i>
Base Technology & Equipment Description
<i>Existing transformers would remain in service</i>

### Resource Savings Assumptions

Electricity	<i>kW or kWh</i>
<i>Increased transformer efficiency (92% to 99%) resulting in lower transformer losses; kWh savings = 2,228,000 (gross), 1,560,000 (net of free ridership)</i>	
Natural Gas	<i>m<sup>3</sup> or Btu or CFM</i>
<i>N/A</i>	
Water	<i>L</i>
<i>N/A</i>	

### Other Input Assumptions

Equipment Life	<i>years</i>
<i>15 year</i>	
Incremental Cost	<i>\$/kW or \$/kWh</i>
<i>All costs deemed incremental since the existing transformers would have otherwise remained in service</i>	
Free Ridership	<i>%</i>
<i>30%</i>	



### Appendix C: Input Assumptions Template

<b>Efficient Technology &amp; Equipment Description</b>	
<i>T8 fluorescent fixtures and disconnection and/or removal of unnecessary fixtures.</i>	
<b>Base Technology &amp; Equipment Description</b>	
<i>T12 fluorescent fixtures.</i>	
<b>Resource Savings Assumptions</b>	
<b>Electricity</b>	<b><i>kW or kWh</i></b>
<i>Annual energy savings as a direct result of this project:</i>	
<i>156 kW</i>	
<i>963,566 kWh</i>	
<b>Natural Gas</b>	<b><i>m<sup>3</sup> or Btu or CFM</i></b>
<i>N/A</i>	
<b>Water</b>	<b><i>L</i></b>
<i>N/A</i>	
<b>Other Input Assumptions</b>	
<b>Equipment Life</b>	<b><i>years</i></b>
<i>3 years</i>	
<b>Incremental Cost</b>	<b><i>\$/kW or \$/kWh</i></b>
<i>\$189,896, \$170,906 (net of 10% free ridership on cost)</i>	
<i>Note that 10% free ridership rate applied to cost; however, 30% free ridership applied to benefits. Net result is a conservative overall TRC.</i>	
<b>Free Ridership</b>	<b><i>%</i></b>
<i>30% on benefits, 10% on cost.</i>	

### Appendix C: Input Assumptions Template

Efficient Technology & Equipment Description	
New three unit compressed air plant with air management. New system capable of being cooled by humidification system water allowing for a 5 month shutdown of cooling tower system.	
Base Technology & Equipment Description	
Oversized air compressor and associated equipment.	
Resource Savings Assumptions	
Electricity	kW or kWh
EQUIPMENT REDUCTION AS PLANNED	
Air Compressor Shutdown	5,512,000 kWh
Cooling Water Pump Winter Shutdown	485,700 kWh
Cooling Tower Fan	12000 kWh
Cooling Tower Heater	61,600 kWh
Total Usage Reduction:	6,071,300 kWh
NEW COMPRESSOR AS BUILT	
Estimated annual usage for air compressor	1,378,330 kWh
<b>NET SAVINGS</b>	<b>4,692,970 kWh</b>
Natural Gas	m <sup>3</sup> or Btu or CFM
N/A	
Water	L
N/A	
Other Input Assumptions	
Equipment Life	years
15 years	
Incremental Cost	\$/kW or \$/kWh
\$812,956 (gross), \$569,069 (net of free ridership)	
Free Ridership	%
30%	

### Appendix C: Input Assumptions Template

Efficient Technology & Equipment Description	
VSD's to control city water booster pumps Lighting upgrade to T8 and HPS Building envelope improvements CO garage exhaust control Individual metering In-suite conservation measures	
Base Technology & Equipment Description	
No VSD's, T12, existing envelope, no CO exhaust control, no individual metering, no in-suite measures.	
Resource Savings Assumptions	
Electricity	kW or kWh
VSD's to control city water booster pumps	154,619 kWh
Lighting upgrade to T8 and HPS	169,825 kWh
Building envelope improvements	263,908 kWh
CO garage exhaust control	213,670 kWh
Individual metering	1,402,056 kWh
In-suite conservation measures	78,575 kWh
<b>Net Savings</b>	<b>2,282,653 kWh</b>
Natural Gas	m <sup>3</sup> or Btu or CFM
N/A	
Water	L
N/A	
Other Input Assumptions	
Equipment Life	years
15 years (average)	
Incremental Cost	\$/kW or \$/kWh
\$995,413 (gross), \$696,789 (net of free ridership)	
Free Ridership	%
30%	

### Appendix C: Input Assumptions Template

Efficient Technology & Equipment Description	
VAV conversion of main fan system with Direct Digital Controls. New HVAC equipment including steam converters, pumps, valves, traps, condensate tank and pump, and insulation. Lighting re-design with direct/direct extruded aluminum fixtures. Occupancy and photocell sensor control.	
Base Technology & Equipment Description	
Main fan system, aging HVAC equipment, existing lighting, no occupancy and photocell sensor control, old in-efficient transformer.	
Resource Savings Assumptions	
Electricity	kW or kWh
VAV conversion of main fan system with Direct Digital Controls.	435,000 kWh
New HVAC equipment including steam converters, pumps, valves, traps, condensate tank and pump, and insulation.	15,500 kWh
Lighting re-design with direct/direct extruded aluminum fixtures.	515,000 kWh
Occupancy and photocell sensor control.	56,936 kWh
<b>Net Savings</b>	<b>1,022,436 kWh</b>
Natural Gas	m <sup>3</sup> or Btu or CFM
N/A	
Water	L
N/A	
Other Input Assumptions	
Equipment Life	years
15 years (average)	
Incremental Cost	\$/kW or \$/kWh
\$4,271,463 (gross), \$2,990,024 (net of free ridership) Note that the above costs are very conservative as they account for all spending at the law building for building refurbishment. It was difficult to break out costs based on the invoice provided.	
Free Ridership	%
30%	