



CITY COUNCIL/ELECTRICAL
ADVISORY COMMITTEE

October 9, 2013 – 6:00 p.m.
Regular Meeting

CITY COUNCIL

Leo Evans, Mayor
Patricia Baribeau, Mayor Pro-Tem
Walter Baker, Council Member
Ronald Beauchamp, Council Member
Marc Tall, Council Member

ADMINISTRATION

James V. O'Toole, City Manager
Robert S. Richards, CMC, City Clerk
Ralph B.K. Peterson, City Attorney
Mike Furmanski, Electrical Superintendent
Michael Dewar, City Controller
Thomas Butz, Power System Engineering

ELECTRICAL ADVISORY COMMITTEE

Tim Wilson, Chairperson
Ann Bissell, Vice Chairperson
Larry Arkens, Committee Member
Glendon Brown, Committee Member
John Anthony, Committee Member
Vacant Seat
Vacant Seat

Escanaba City Council Chambers: 410 Ludington Street - Escanaba, MI 49829

Meeting Agenda

Wednesday, October 9, 2013

CALL TO ORDER
ROLL CALL
APPROVAL/ADJUSTMENTS TO THE AGENDA
CONFLICT OF INTEREST DECLARATION
NEW BUSINESS

- 1. Update - Electric Department –General Operations.**
Explanation: Electrical Superintendent Mike Furmanski will update the City Council, Electrical Advisory Committee and Citizens of Escanaba on the current departmental activities.
- 2. Update– Operation and Maintenance of Power Plant – Pro Energy Services, Inc.**
Explanation: Pro Energy Services, Inc. will update the City Council, Electrical Advisory Committee and Citizens of Escanaba on the status of the operation and maintenance of the Power Plant.
- 3. Approval – Transformer Purchase.**
Explanation: Administration will seek Council approval of a bid submitted by RESCO of Middlehurst, WI, for various sized transformers.
- 4. Update – UPPCO Mediation.**
Explanation: Administration will provide an update regarding the mediation between the City of Escanaba and UPPCO related to the termination of UPPCO operating the plant.

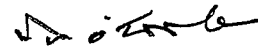
5. Update – Power Plant Purchase Agreement.

Explanation: Administration will provide an update on the status of Power Plant Purchase Agreement between the City of Escanaba and Escanaba Green Energy, LLC.

GENERAL PUBLIC COMMENT
COMMISSION/STAFF COMMENT AND ANNOUNCEMENTS
ADJOURNMENT

The City of Escanaba will provide all necessary, reasonable aids and services, such as signers for the hearing impaired and audiotapes of printed materials being considered at the meeting to individuals with disabilities at the meeting/hearing upon five days notice to the City of Escanaba. Individuals with disabilities requiring auxiliary aids or services should contact the City of Escanaba by writing or calling City Hall at (906) 786-9402.

Respectfully Submitted,



James V. O'Toole
City Manager

OFFICIAL PROCEEDINGS
CITY COUNCIL
ELECTRICAL ADVISORY COMMITTEE
CITY OF ESCANABA, MICHIGAN
Special Joint Meeting
Wednesday, September 11, 2013

Pursuit to a meeting notice posted September 6, 2013, the meeting was called to order by the Mayor Leo J. Evans at 6:01 p.m. in the Council Chambers of City Hall located at 410 Ludington Street.

Present: Mayor Leo J. Evans, Council Members, Walter A. "Pete" Baker, Ronald J. Beauchamp, and Marc D. Tall (arrived at 6:07 p.m.)

Absent: Council Member Patricia A. Baribeau

Baker moved, Beauchamp seconded, **CARRIED UNANIMOUSLY**, to excuse Council Member Baribeau who was out of the community.

Present: Electrical Advisory Committee (EAC) Members: Jon Anthony, Larry Arkens, and Glendon Brown. **NO QUORUM**

Absent: Electrical Advisory Committee Members: Chairperson Tim Wilson, and Ann Bissell, Two vacancies and Power Plant Liaison.

Also Present: City Manager James V. O'Toole, City Attorney Ralph B.K. Peterson, Electric Superintendent Mike Furmanski, City Controller Mike Dewar, Charles DeTiege of Escanaba Green Energy (EGE), members of the public and media.

Beauchamp moved, Baker seconded, **CARRIED UNANIMOUSLY**, to approve the agenda as submitted.

UNFINISHED BUSINESS – None

CONFLICT OF INTEREST – None

PUBLIC HEARING – None

NEW BUSINESS

Update - Electric Department –General Operations.

Electrical Superintendent Mike Furmanski updated the City Council, Electrical Advisory Committee and Citizens of Escanaba on the current departmental activities:

- Auto Zone and O'Rilley services;
- Pole change outs.

Update– Operation and Maintenance of Power Plant – Pro Energy Services, Inc.

Pro Energy Services, Inc. updated the City Council, Electrical Advisory Committee

and Citizens of Escanaba on the status of the operation and maintenance of the power plant:

- Combustion Turbine ran for a opacity test. No generation from the plant in August;
- No injuries.

Update – Power Plant Purchase Agreement.

Administration provided an update on the status of Power Plant Purchase Agreement between the City of Escanaba and Escanaba Green Energy, LLC.

- Charles DeTiege of EGE advised terms for their loan was received. They were currently working on resolving questions and clarification of the terms;
- Mr. DeTiege briefly reviewed clarification language they were addressing;
- Mr. DeTiege advised once terms were agreed too, a closing date would be provided.

Discussion – Fiscal Year 2012/2013 Electric Utility Fund Financial Recap.

City Controller Mike Dewar presented an overview of the financial results of the Electric Funds 2012/2013 operations. (See Attachment – A)

- Briefly discussed the SSR Agreement being proposed for the Presque Isle Power Plant in Marquette, Michigan.

Approval – Asset Transfer Agreement - Escanaba #2 Transmission Line.

Administration sought approval to transfer Escanaba's #2 transmission line to the American Transmission Company.

- This was part of the ATC system upgrade;
- Escanaba Distribution System would no longer need to provide maintenance for these lines, but City would have the benefit of having power provided into the City over these lines if required;
- Discussed the value the City was receiving for the sale of the line;
- Asset was considered as part of the plant, not the distribution system.

NB-5 After discussion, Baker moved, Tall seconded, **CARRIED UNANIMOUSLY**, to transfer Escanaba's #2 transmission line to the American Transmission Company for no less than \$100,000.

Upon a call of the roll, the vote was as follows:

Ayes: Baker, Tall, Beauchamp Evans

Nays: None

MOTION CARRIED.

Approval – Pole Inspection/Treatment.

Electric Superintendent Mike Furmanski briefly reviewed the City replacement program, and after discussion sought Council approval to award the 2013 Electrical Distribution Pole Inspection/Treatment bid to Karcz Utility Services, LLC of Seymour, WI, in an amount not to exceed \$12,000. This purchase was included in the current operating budget.

NB-6 Beauchamp moved, Tall seconded, to approve an award for the 2013 Electrical Distribution Pole Inspection/Treatment bid to Karcz Utility Services, LLC of Seymour, WI, in an amount not to exceed \$12,000.

Upon a call of the roll, the vote was as follows:

Ayes: Beauchamp, Tall, Baker, Evans
Nays: None

MOTION CARRIED.

Discussion – UPPCO Operating Agreement – Non-Binding Mediation.

Manager O'Toole led a discussion on the possibility of going into non-binding mediation with the Upper Peninsula Power Company (UPPCO) in an attempt to resolve outstanding issues related to the terminated Power Plant Operating Agreement between the City of Escanaba and UPPCO.

City Attorney Peterson briefly reviewed three basic issues, pension costs, workers compensation case during the time UPPCO ran the plant due to UPPCO negligence, and how City paid Administrative costs over the last 50 years. Mr. Peterson also reviewed the difference between Binding and Non-Binding arbitration.

NB-7 After discussion, Beauchamp moved, Baker seconded, to approve Administration to enter into non-binding mediation with the Upper Peninsula Power Company (UPPCO) in an attempt to resolve outstanding issues related to the terminated Power Plant Operating Agreement between the City of Escanaba and UPPCO.

Upon a call of the roll, the vote was as follows:

Ayes: Beauchamp, Baker, Tall, Evans
Nays: None

Joint City Council & Electrical Advisory Minutes
September 11, 2013 – cont.

MOTION CARRIED.

GENERAL PUBLIC COMMENT – None

COUNCIL/COMMITTEE, STAFF REPORTS - None

ADJOURNMENT

Hearing no further public comment, or further reports from the Electrical Advisory Committee or Council, the meeting adjourned at 7:23 p.m.

Respectfully submitted,

Robert S. Richards, CMC
City Clerk

Approved: _____

Leo J. Evans, Mayor

CITY OF ESCANABA

2012-2013 Electric Fund

Comparison to Prior Years and to Budget

U:\123R3\ELECTRIC\Financial\3 Yrs Ended 063013

	Actual 2010-11	Actual 2011-12	8/23/13 Unaudited 2012-13	Budget 2012-13	Comparison to Budget	Budget Estimate 2012-13	Comparison of Unaudited to Estimate
Interchange Revenues	\$7,099,874	\$3,886,369	\$804,464	\$0	\$804,464	\$1,510,000	(\$705,536)
MISO SSR Payments	0	0	3,711,525	0	3,711,525	3,521,000	190,525
TOTAL GENERATING REVENUES	7,099,874	3,886,369	4,515,989	0	4,515,989	5,031,000	(515,011)
O&M (UPPCo / ProEnergy)	4,496,648	3,530,289	2,974,310	0	(2,974,310)	2,850,000	(124,310)
Production Expenses - Other	362,989	302,919	235,066	0	(235,066)	218,000	(17,066)
Steam Fuel	5,422,201	2,730,678	684,334	0	(684,334)	1,000,000	315,666
Combustion Turbine Expenses	490,182	360,035	144,953	0	(144,953)	143,000	(1,953)
Plant Management Fees	47,738	274,433	350,000	0	(350,000)	350,000	0
UPPCo Prior Years Costs	0	416,423	0	0	0	0	0
Depreciation Expense-Power Plant	787,884	566,745	564,972	0	(564,972)	600,000	35,028
TOTAL GENERATING EXPENSES	11,607,642	8,181,522	4,953,635	0	(4,953,635)	5,161,000	207,365
GENERATION OPERATING RESULTS	(\$4,507,768)	(\$4,295,153)	(\$437,646)	\$0	(\$437,646)	(\$130,000)	(\$307,646)
POWER PURCHASES OPERATIONS							
Residential Sales	\$3,906,612	\$4,018,521	\$3,803,413	\$4,050,000	(\$246,587)	\$3,800,000	\$3,413
Hot Water Sales	32,179	32,838	29,685	33,000	(3,315)	30,000	(315)
Heating Sales	31,421	27,243	26,281	29,000	(2,719)	25,000	1,281
Dusk to Dawn Sales	54,371	55,318	48,123	56,000	(7,877)	48,000	123
Commercial Sales	4,407,015	4,499,018	3,278,804	4,625,000	(1,346,196)	3,255,000	23,804
Industrial Sales	5,285,249	5,466,446	4,767,736	5,525,000	(757,264)	4,700,000	67,736
Municipal Sales	563,583	579,429	495,502	582,000	(86,498)	495,000	502
Street Lighting Sales	169,528	174,540	162,881	176,000	(13,119)	165,000	(2,119)
TOTAL PURCHASED POWER REVENUES	14,449,958	14,853,353	12,612,425	15,076,000	(2,463,575)	12,518,000	94,425
Dispatching Fees	72,900	85,871	60,312	89,562	29,250	60,300	(12)
MISO Purchased Power	7,660,213	3,157,731	(123,285)	0	123,285	0	123,285
NextEra Power Purchases	0	4,200,745	8,348,700	8,764,850	416,150	8,140,000	(208,700)
Capacity Charges & REC Purchases	0	7,040	27,370	74,964	47,594	27,000	(370)
MISO Monthly	166,802	189,608	231,489	180,000	(51,489)	216,250	(15,239)
ATC Transmission Charges	1,168,956	1,157,028	1,187,542	1,216,170	28,628	1,187,500	(42)
TOTAL PURCHASED POWER EXPENSES	9,068,871	8,798,023	9,732,128	10,325,546	593,418	9,631,050	(101,078)
POWER PURCHASES OPERATING RESULTS	\$5,381,087	\$6,055,330	\$2,880,297	\$4,750,454	(\$1,870,157)	\$2,886,950	(\$6,653)

CITY OF ESCANABA
2012-2013 Electric Fund

Comparison to Prior Years and to Budget

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	Actual 2010-11	Actual 2011-12	8/23/13 Unaudited 2012-13	Budget 2012-13	Comparison to Budget	Budget Estimate 2012-13	Comparison of Unaudited to Estimate
DISTRIBUTION OPERATIONS							
State Mandated Charges	\$130,147	\$191,450	\$211,576	\$280,000	(\$68,424)	\$264,500	(\$52,924)
Energy Conservation Promotion	(130,147)	(212,086)	(180,330)	(280,000)	(99,670)	(262,000)	81,670
NET	\$0	(\$20,636)	\$31,246	\$0	\$31,246	\$2,500	\$28,746
Connection Charges	20,758	22,600	21,456	20,000	1,456	22,000	(544)
Penalties on Utility Collections	69,857	52,472	43,929	55,000	(11,071)	45,000	(1,071)
Pole Rentals	45,816	47,190	48,384	47,200	1,184	48,400	(16)
Miscellaneous Revenues	4,720	16,771	31,761	4,000	27,761	28,200	3,561
TOTAL DISTRIBUTION OPERATION REVENUES	141,151	118,397	176,776	126,200	50,576	146,100	30,676
Total General Admin	1,355,314	1,306,116	1,135,536	1,230,507	94,971	1,204,600	69,064
Total Transmission & Distribution	351,688	253,302	449,008	428,514	(20,494)	413,850	(35,158)
Total Customer Service	20,675	24,428	14,539	27,684	13,145	19,000	4,461
Depreciation Distribution System	299,211	318,843	241,828	300,000	58,172	325,000	83,172
Overhead to Utilities	542,740	551,070	549,410	551,347	1,937	562,025	12,615
TOTAL DISTRIBUTION OPERATION EXPENSES	2,569,628	2,453,759	2,390,321	2,538,052	147,731	2,524,475	134,154
DISTRIBUTION OPERATIONS RESULTS	(\$2,428,477)	(\$2,335,362)	(\$2,213,545)	(\$2,411,852)	\$198,307	(\$2,378,375)	\$164,830
OTHER INCOME / (EXPENSE)							
Interest Income	\$196,211	\$226,277	\$214,990	\$225,000	(\$10,010)	\$220,000	(\$5,010)
Gain/(Loss) on Investments	43,172	84,161	(164,909)	0	(164,909)	0	(164,909)
Increase in Market Value of Inventory	994,071	0	0	0	0	0	0
Generating Plant Clean-Up Costs	0	0	(378,497)	0	(378,497)	0	(378,497)
Contribution to General Fund	(463,624)	(463,624)	(463,624)	(463,624)	0	(463,625)	1
TOTAL OTHER INCOME / (EXPENSE)	\$769,830	(\$153,186)	(\$792,040)	(\$238,624)	(\$553,416)	(\$243,625)	(\$548,415)
NET INCOME / (LOSS)	(\$785,328)	(\$728,371)	(\$562,933)	\$2,099,978	(\$2,662,911)	\$134,950	(\$697,883)

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CITY OF ESCANABA

2012-2013 Electric Fund

Comparison to Prior Years and to Budget

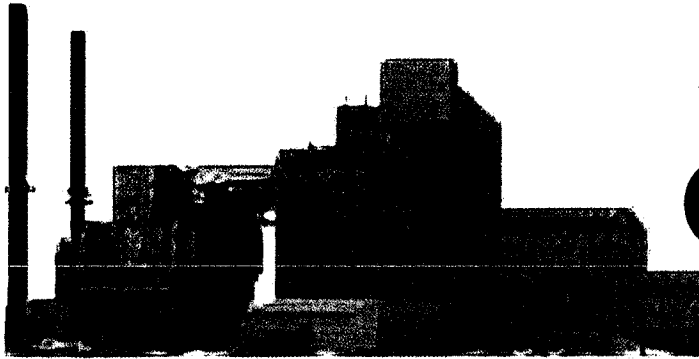
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	Actual 2010-11	Actual 2011-12	8/23/13 Unaudited 2012-13	Budget 2012-13	Comparison to Budget	Budget Estimate 2012-13	Comparison of Unaudited to Estimate
CALCULATION OF NET INCOME LESS ONE-TIME / EXTRAORDINARY TRANSACTIONS							
NET INCOME / (LOSS)	(\$785,328)	(\$728,371)	(\$562,933)				
Eliminate One-Time / Extraordinary Transactions:							
Gain/(Loss) on Investments	(43,172)	(84,161)	164,909				
Increase in Market Value of Inventory	(994,071)	0	0				
Generating Plant Clean-Up Costs	0	0	378,497				
ADJUSTED NET INCOME / (LOSS)	(\$1,822,571)	(\$812,532)	(\$19,527)				
CALCULATION OF NET INCOME WITHOUT GENERATION EFFECT							
ADJUSTED NET INCOME / (LOSS)	(\$1,822,571)	(\$812,532)	(\$19,527)				
Eliminate Generation Operations Results	4,507,768	4,295,153	437,646				
ADJUSTED NET INCOME / (LOSS)	\$2,685,197	\$3,482,621	\$418,118				

Escanaba Operating Services

Monthly Report

September 2013



Escanaba Generating Station

**Escanaba
Operating
Services**

Executive Summary

The power plant was called upon to operate during the month of September. Plant employees continued repairing and replacing existing equipment that has been in service well beyond its original design life.

There is **10,194** tons of coal on the dock. The OSHA incident, rate for September 2013 is 7.2.

Key Performance Indicators (Note: This table is for the City's fiscal year August 2013 through August 2014.)

Measure	Unit of Measure	Month	Year to Date
Steam Plant Gross Electrical Generation	MWH	773	14002
Unit 1 Net Electrical Generation	MWH	664	6334
Unit 2 Net Electrical Generation	MWH	0	4850
Unit 1 Hours of Operation	Hours	106	1176.7
Unit 2 Hours of Operation	Hours	0	869
Coal Consumption	Tons	612.5	7893.9
Coal on Dock	Tons	10194	10194
Steam Plant Net Heat Rate	BTU/KWH	n/a	n/a
Plant Availability	%	79%	92%
Combustion Turbine Gross Electrical Generation	MWH	168	497
Combustion Turbine Station Service	MWH	8.2	255
Combustion Turbine Hours of Operation	Hours	28.3	72.6
Fuel Oil Consumption	Gallons	28755	80436
Combustion Turbine Availability	%	100%	100%

Operations Summary

Unit Start-Ups and Shut Downs

Turbine-Generator Unit 1 was operated during the month of September. The Combustion Turbine was operated for system support and the annual opacity test. Unit 2 was not operated in September.

Unit	Date	On-Line Time	Off-Line Time	Reason
1	9/9	0813		MISO Request
1	9/13		1754	MISO Request
2				
2				
CT	9/10	1356	1817	MISO Request
CT	9/13	0100	0100	MISO 24 Hour Run

Unit Trips and Unplanned Outages

Turbine Generator No. 1 was taken out of service on September 17 due to a damaged #2 Bearing. The unit remains out of service as of the date of this report.

Unit	Date	Breaker Open Time	Unit Released	Duration (Hours)	Cause
1	9/18	OOS		On Going	Failure of the No.2 Turbine Bearing (Electrolysis)
2	None				
CTG	None				

Planned Outages

Unit	Start Date	Start Time	End Date	End Time	Cause
1	None				
2	None				
CTG	None				

Forced Outages or Load Reduction Events

Unit	Start Date	End Date	End Time	Load Limit	Cause
1	None				
2	None				
CTG	None				

Maintenance Activities

Plant Maintenance Activities for September 2013

Unit 1

Routine maintenance and equipment replacements occurred throughout the month.

#1 Turbine Generator was taken out of service and partially dismantled to determine the source of a very apparent internal noise that should not be present during turning gear operations. ProEnergy Services sent a Turbine Generator Specialist to the plant to determine the root cause of the problem. Initially, the turbine bearings were inspected and the #2 bearing was found to have some wasting of the bearing Babbitt material on the lower half of the bearing. The wasting was indicative of internal electrolysis (stray electrical currents) within the turbine. Root cause analysis of the problem is underway. The damaged bearing was sent to **PME Babbitt Bearings** in Cincinnati Ohio for repair. Electrical tests of bushings that protect the turbine from stray current have been arranged and will be conducted by plant personnel. Additionally, there is indication that the #1 Turbine rotor, (blades) may be contacting the internal seals of the turbine housing. This may be the result of poor alignment or the result of the failed bearing. Alignment will be checked when the failed bearing is returned to the plant and installed. The return of Unit 1 Turbine-Generator to service cannot be determined at this time.

Unit 2

Routine maintenance and equipment replacements occurred throughout the month.

Combustion Turbine

There were no repairs required on the Combustion Turbine/Generator.

Plant Outstanding Issues:

Unit 1 Turbine Generator was taken out of service. There are no other outstanding issues at the time of this report.

Emissions Compliance Overview-Air/Water

- There were no Air Monitoring deviations in the month of September.

Air Monitoring Deviations

Start Date	Start Time	End Date	End Time	Opacity Parameter	Cause
None					

Water – NPDES Permit Deviations

- There were no NPDES violations during the month of September.

Water – Groundwater

- There were no Groundwater deviations during the month of September.

Water Monitoring Deviations

Start Date	End Date	Parameter	Cause
None			

Occupational Safety and Health Overview

OSHA Summary of Work Related Injuries and Illnesses

- 1) There were no OSHA work related injuries or illnesses during the month of September.

EH&S Incidents – (Near Misses and/or Property Damage)

- 1) There were no lost time accidents, near misses or property damage during the month.

Labor Statistics

Labor Statistics (Note: These statistics are for the 2013 calendar year from Jan 1 through December 31.)

Item	Month	Year to Date
Total Man-Hours Worked	2883.5	27732.25
Total Number of Standard Time (ST) Hours	2423	24478.6
Total Number of Overtime (OT) Hours	166.5	1059.5
Total Number of Double Time (DT) Hours	294	2193.75

MEMORANDUM

To: Jim O'Toole

From: Mike Furmanski

Date: 03OCT13

Re: transformer bid of October 1, 2013

The Electric Department requested bids for transformers of various sizes for our stock.

Invitations to bid were sent to 7 sources, with 7 suppliers submitting bids. All bidders were informed that the transformer bid would be evaluated for initial cost and operating cost.

The initial cost, plus the electrical evaluations over the projected life of the transformers ranks the bidders as follows (starting with the least cost):

BIDDER	TRANSFORMER MAKE
RESCO	Ermco
Champion	GE
RESCO	Howard
WESCO	ABB
Power Line Supply	CG Power
Power Line Supply	Howard
RESCO	CG Power
RESCO	Howard #2
Solomon Corp	Solomon
Power Line Supply	Cooper
Border States Electric	Cooper
Central Maloney	Maloney

After evaluating the bids, I recommend acceptance of the RESCO bid of the ERMCO transformers in the amount of \$44,008.

**CITY OF ESCANABA
RECORD OF BIDS**

DATE BIDS OPENED: 1-Oct-13
DESCRIPTION OF ITEM: Transformer Bid

NAME OF BIDDER	One 112.5 KVA 120/280V	Three 150 KVA 120/280V	One 300 KVA 120/208V	One 1000 KVA 227/480V	TOTAL PRICE
	Padmount/Three Phase	Padmount/Three Phase	Padmount/Three Phase	Padmount/Three Phase	
Solomon Corp	5930	6585 ea	9105	16485	51275
Power Line Supply (cooper)	6344	6866 ea	8390	14786	50118
Power Line Supply (Howard)	5643	6000 ea	8811	14681	47135
Power Line Supply (CG Power)	5446	6048 ea	8358	15139	47087
Border States Electric	6541.36	21237.93	8650.58	15245.44	51675.3
WESCO	5971	63166 ea	8289	16337	49695
Central Maloney	8484	8538 ea	11634	22019	68651
RESCO (Ermco)	5369	5712 ea	7473	14030	44008
RESCO (CG Power)	5500	6110 ea	8440	15290	47560
RESCO (Howard)	5701	6061 ea	8902	14830	47616
RESCO (Howard) amorph	6325	6350 ea	9916	16775	52066
Champion Inc	5532	5823 ea	7700	13269	43970

PRESENT: ROBERT RICHARDS, Josh Krajniak

September 2013 Transformer Bid Evaluation

Bidder	Mfr	Quoted Price + loss adjustments																		TOTAL EVAL COST	Lead Time
		%Z	NLL	FLL	(1) 3Ph 112.5 KVA 120/208V	%Z	NLL	FLL	(3) 3Ph 150 KVA 120/208V	%Z	NLL	FLL	(1) 3Ph 300KVA 120/208V	%Z	NLL	FLL	(1) 3Ph 1000KVA 277/480V				
RESCO #1	Ermco	4.7	275	1637	\$27,607.17	4.2	419	3217	\$13,672.91	6	1118	7983	\$29,840.00	\$134,554.57	8-10 wks						
Champion Inc	GE	3.42	281	1730	\$28,378.29	4.64	504	2708	\$13,740.48	5.71	1310	6200	\$27,946.30	\$135,311.70	10 wks						
RESCO #4	Howard (Amorphous Core)	3.7	121	2082	\$28,641.21	3.7	218	2712	\$14,408.38	5.8	496	8190	\$29,460.08	\$138,346.99	10-12 wks						
WESCO	ABB	2.04	279	1566	\$29,374.47	1.55	427	2675	\$13,871.11	5.74	1066	6533	\$30,095.64	\$140,517.77	6-9 wks						
Power Line Supply #3	CG Power	3.25	265	1816	\$29,107.41	3.1	453	2839	\$14,281.37	5.75	1027	8851	\$31,513.83	\$141,504.02	8-10 wks						
Power Line Supply #2	Howard	3.3	292	1728	\$29,081.16	4.2	541	2634	\$14,962.11	5.8	1222	8007	\$31,085.00	\$141,938.42	8-10 wks						
RESCO #2	CG Power	3.25	265	1816	\$29,293.41	3.1	453	2839	\$14,363.37	5.75	1027	8851	\$31,664.83	\$142,349.02	8-10 wks						
RESCO #3	Howard (Silicon Core)	3.3	292	1728	\$29,264.16	4.2	541	2634	\$15,053.11	5.8	1222	8007	\$31,234.00	\$142,785.42	8-10 wks						
Solomon Corp	Solomon (remanufactured)	3.25	265	1816	\$30,718.41	3.1	453	2839	\$15,028.37	5.75	1027	8851	\$32,859.83	\$148,914.02	8-10 wks						
Power Line Supply #1	Cooper	4.26	275	1784	\$31,607.19	3.59	499	2899	\$14,636.35	5.75	1110	7871	\$30,415.92	\$149,163.33	16-18 wks						
Border States Electric	Cooper	4.26	275	1784	\$32,247.12	3.59	499	2899	\$14,896.93	5.75	1110	7871	\$30,875.36	\$152,000.50	14-18 wks						
Central Moloney	Moloney	2.14	259	1778	\$36,340.59	1.88	443	2574	\$17,179.77	5.49	1104	8393	\$38,253.18	\$175,792.09	12 wks						

no load loss modifier per watt 5.43
 full load loss modifier per watt 1.22