

**OKANOGAN COUNTY ELECTRIC COOPERATIVE
2011 – 2031 LONG RANGE PLAN**

Prepared For:

Okanogan County Electric Cooperative
93 West Chewuch Rd.
Winthrop, WA 98862

Prepared By:

Electrical Consultants, Inc.
3521 Gabel Road
Billings, MT 59102

May 2011



2 **EXECUTIVE SUMMARY**

This report presents results of a Twenty (20) Year Long Range Plan prepared by Electrical Consultants, Inc. (ECI) for Okanogan County Electric Cooperative (OCEC). The purpose of this plan, as outlined in Section 1 of this report, is to provide OCEC with an orderly plan for carrying out construction and other needed improvements in the most economic manner possible. The plan area included OCEC's entire distribution system.

All recommendations were designed to be in general concurrence with planning criteria and to insure that no adverse impacts to the integrity of OCEC's system were imposed. Single contingency outages were investigated through analysis of load flow and voltage drop studies to address system requirements during such operating conditions. The mechanical condition of the OCEC plant, along with reliability of service to members was also factored into the recommendations for system improvement. Planning criteria and historical system information are discussed in Sections 3 and 4 respectively.

A thorough review of existing system performance with present, transition (10 year) and long range (20 year) projected loading is provided in Section 5, accompanied by maps provided in the Appendix. Detailed descriptions of each of the transition and long range distribution alternatives are provided in Section 6 of this report.

A review of existing system performance as well as long range (20 year) projected loading is also analyzed by reducing any load over 10 kW by 43%. This same system is analyzed by reducing the load by 30% as well and then by taking approximately 45% of customers over 10 kW and reducing these loads by 30%. The results of this analysis are provided at the end of Section 6.

2.0 **Existing System Performance**

Figure 2-0-1 on the following page displays OCEC's system kW demands since 2000 and projected twenty (20) year usage based upon historic load data and Least Squares Statistical Regression technique. Based upon historical kW usage, OCEC's system has a projected annual growth rate of 1.8% with losses at the end of the twenty (20) year study period. It is anticipated that the highest growth on OCEC's system will occur in the

System Total

kW Trend

Omitted Mazama Circuit

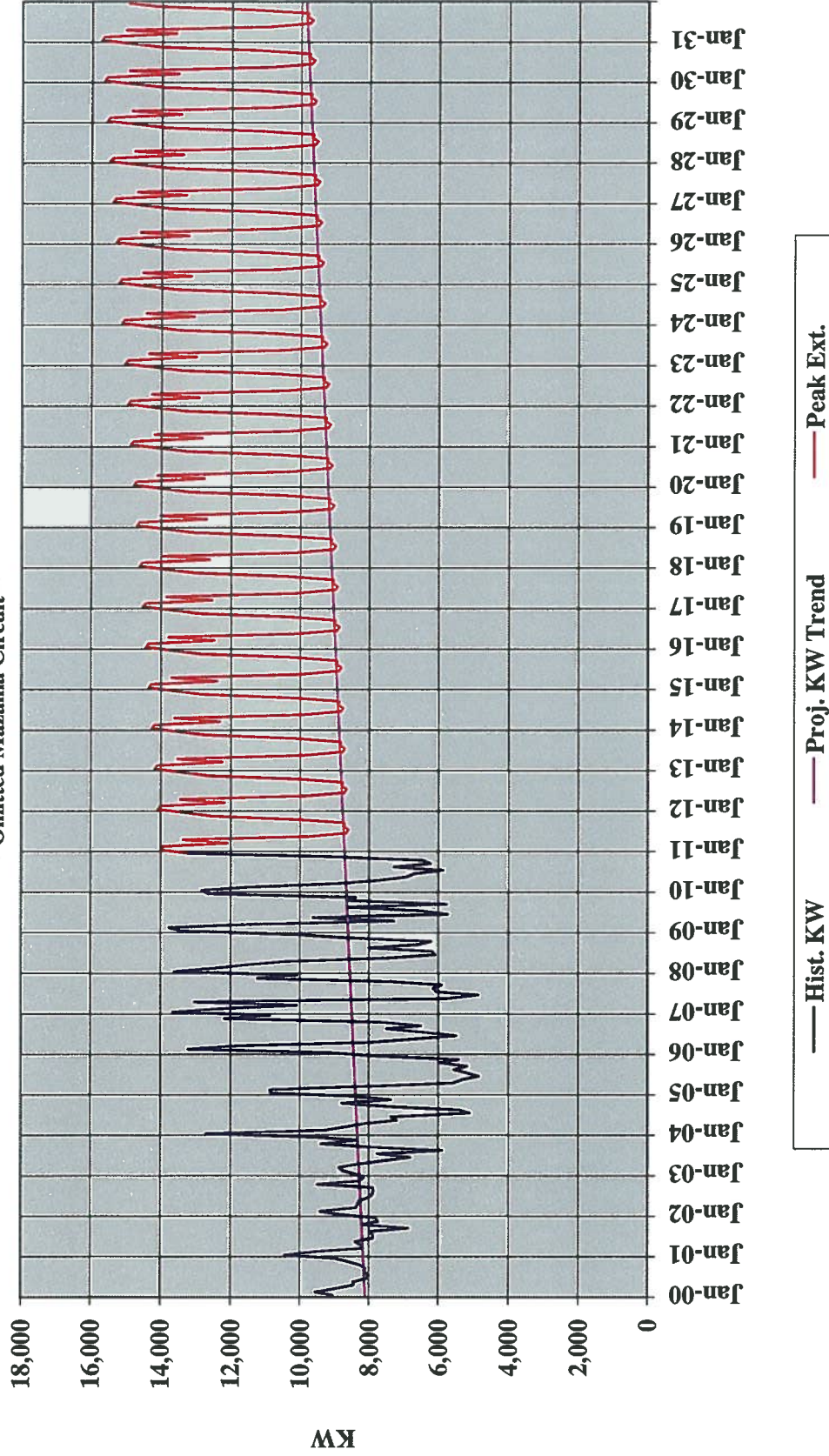


Figure 2-0-1

Mazama Service area, which is not included as part of this study. The next highest growth area on OCEC's system is anticipated to be in the Sun Mountain and West Chewuch Service areas. The non-coincident peak loads that were utilized for the load flow analysis consisted of 14.0 MW for the existing system, 16.06 MW for the ten (10) year forecasted load level and 18.11 MW for the twenty (20) year forecasted loads. Section 4.4 (*Historical Demand and Energy Use*), contains detailed discussions pertaining to the load projections utilized for the load flow analysis.

Analysis of the existing system generally portrays a system that has been well maintained, resulting in few inadequacies. There are a few areas on OCEC's service area that fall below the established voltage criteria (118 volts) with existing system loads, namely Twisp, Sun Mountain, and West Chewuch service areas. With projected twenty (20) year loads, the area of Winthrop Town Circuit, as well as the previously named service areas, falls below the established voltage criteria.

The majority of the improvements recommended in this Long Range Plan are due to concerns during "normal" system conditions with the anticipated growth of OCEC's system. When projected loads were applied to the system, several areas of concern became apparent.

2.1 Recommended Plan Description

The recommended plan improves all voltage levels within planning criteria, accounting for projected load additions throughout the system. The major improvements outlined include extending the three-phase from Winthrop Town circuit to the Sun Mountain Circuit and upgrading the single-phase underground line to a three-phase 4/0 Al. Also recommended is to extend the three-phase on West Chewuch, near section 4459, approximately 2.6 miles with 1/0 ACSR. This will not only improve the capacity on the line by changing from a small conductor to a larger one, but will also allow for better phase-balancing in this area. Other major improvements include installing three (3) 167 kVA regulators at section 4677 on the West Chewuch feeder. These regulators will improve low voltage situations with 20-year projected loads. Some major improvements were recommended in the Twisp service area such as re-conductoring the existing #6A

CWC conductor from section 7840 approximately 3.22 miles with 4/0 ACSR, however this line is lightly loaded and OCEC has indicated it may be abandoned in the near future. The other major improvement in the Twisp area recommends installing a set of three (3) 167 kVA regulators near section 10944 to improve voltage levels at the extremities of this circuit for 20-year projected loads.

Alternative recommendations include conversion to 24.9 kV in both the Winthrop and Twisp service area. By converting the system to 24.9 kV, OCEC would improve voltage levels to within planning criteria without having to rebuild existing lines with larger conductors, decrease system losses, as well as provide functional capability of load transfer between adjacent substations. The total cost of losses for a 24.9 kV system is approximately \$484,900.00, whereas the cost of losses for maintaining the existing system at 12.47 kV over the twenty (20) year planning period is approximately \$3,357,800.00.

Figure 2-1-1, included as a map in the back pocket of this report, shows OCEC's recommended improvements to the existing system.

2.2 Ordinary Replacements

As part of the planning process, evaluation of system reliability and mechanical condition was completed for the distribution system.

Review of the outage history reveals that during the three (3) year period between 2004 and 2006, as well as the two (2) year period between 2008 and 2009, consumer outage hours per year were well below established RUS criteria to be classified as "reliable service". However, OCEC service interruptions for 2006 averaged 40.98 hours per consumer, and in 2009 there was an interruption average of 47.78 hours per consumer, which does not adhere to the RUS standard of service reliability. This is due, primarily, to the service interruption from the power supplier that the service area endured in those years. OCEC's five-year average is 21.61, which greatly exceeds the satisfactory quality of service of 5.0 hours per year.

2.3 Recommended Plan Cost Summary

The following pages list the recommended improvements. Total cost of the plan is estimated at \$361,000. All costs are in 2010 dollars.

The Long Range Study is intended to provide a plan for staged improvements should certain loads develop. Thus, it is noted that some of the loads may never come to fruition and certain improvements may not be necessary. Individual Construction Work Plans throughout the twenty (20) year planning period will dictate the actual improvements required.

Tables 2-6-1 and 2-6-2 on the following pages summarize improvements by service area and improvements by year, respectively.

OCEC

Table 2-6-1

Recommended Cost by Substation

Project Code	Sub	Priority	Mul	Miles/ Qty	Construction Description	Unit Cost	Total Cost
Substation: Twisp							
TW-LRP	Twisp	11	1	1	Install (3) 167 kVA, 219 amp Regulators Equipment	\$35,140	\$35,000
						Total Twisp Cost	\$35,000
Substation: Winthrop							
SM-02	Winthrop	2	1	1.3	Extend 3Ph. from Winthrop Town Ckt. Replace existing URD with 4/0 URD	\$109,285	\$142,000
SM-02A	Winthrop	2	1	1	Install Group Switch, 25 kV Equipment	\$5,000	\$5,000
SM-02B	Winthrop	2	1	1	Install Group Switch, 25 kV Equipment	\$5,000	\$5,000
SM-LRP	Winthrop	11	1	1	Install (3) 167 kVA, 219 amp Regulators Equipment	\$35,140	\$35,000
WC-01	Winthrop	1	1	2.6	Extend 3 phase from section 4493 approx. 2.6 miles	\$40,146	\$104,000
WC-LRP	Winthrop	11	1	1	Install (3) 167 kVA, 219 amp Regulators Equipment	\$35,140	\$35,000
						Total Winthrop Cost	\$326,000

OCEC

Table 2-6-1

Recommended Cost by Substation

Project Code	Sub	Priority	Mul	Miles/ Qty	Construction Description	Unit Cost	Total Cost
						Total Recommended Cost	\$361,000

OCEC

Table 2-6-2

Recommended Cost by Year

Project Code	Substation/ Item	Feeder	Priority	Miles/ Qty	Construction Description	Unit Cost	Total Cost
WC-01	Winthrop	West Chewuch	1	2.6	Extend 3 phase from section 4493 approx. 2.6 miles	\$40,146	\$104,000
Total Year 1 Cost							\$104,000
SM-02	Winthrop	Sun Mountain	2	1.3	Extend 3Ph. from Winthrop Town Ckt. Replace existing URD with 4/0 URD	\$109,285	\$142,000
SM-02A	Winthrop	Sun Mountain	2	1	Install Group Switch, 25 kV Equipment	\$5,000	\$5,000
SM-02B	Winthrop	Sun Mountain	2	1	Install Group Switch, 25 kV Equipment	\$5,000	\$5,000
Total Year 2 Cost							\$152,000
SM-LRP	Winthrop	Sun Mountain	11	1	Install (3) 167 kVA, 219 amp Regulators Equipment	\$35,140	\$35,000
TW-LRP	Twisp	Twisp	11	1	Install (3) 167 kVA, 219 amp Regulators Equipment	\$35,140	\$35,000
WC-LRP	Winthrop	West Chewuch	11	1	Install (3) 167 kVA, 219 amp Regulators Equipment	\$35,140	\$35,000
Total Long Range Cost							\$105,000
Total Recommended Cost							\$361,000