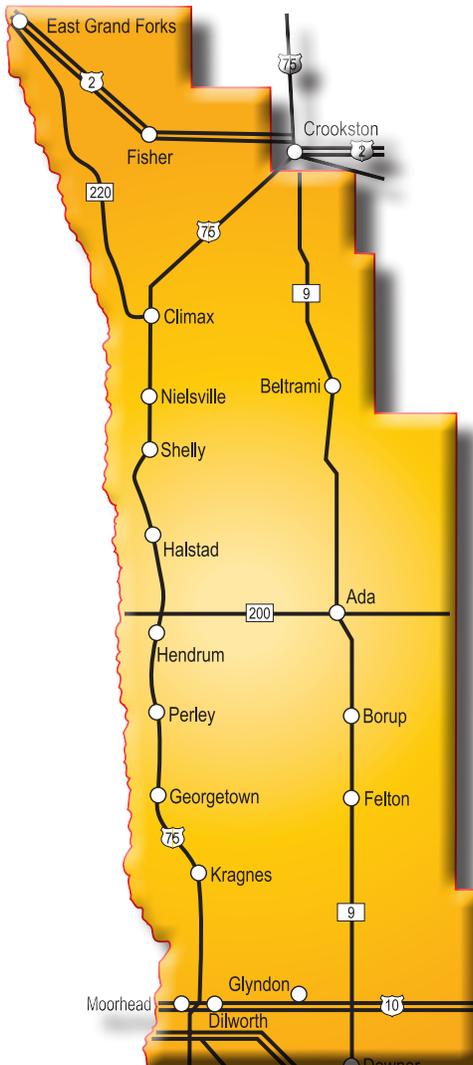




**RED RIVER VALLEY  
CO-OP POWER**

# Guide for Contractors

January 2022



**PO Box 358  
Halstad, MN 56548  
218-456-2139  
1-800-788-7784  
[www.rrvcoop.com](http://www.rrvcoop.com)**

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# Off-Peak Program & Contacts

## **What is Red River Valley Co-op Power's Off-Peak Electric Heating program?**

To receive the low off-peak electric heating rate, electric heat must be the primary heating source with an automatic backup fossil fuel heating system for times when the electric heat is being controlled. Wood, corn or pellet systems do not qualify as acceptable automatic backup heating systems. A variety of electric heating systems including plenum heaters, heat pumps and Steffes electric thermal storage systems are compatible with off-peak provided you have a reliable back-up fossil fuel heating system. The exceptions to needing a back-up fossil fuel heating source to qualify for off-peak are Steffes electric thermal storage systems and floor heat with a properly installed heat storage base.

January 01, 2022

### **Off-peak rate**

The current off-peak rate for dual heat and cycled storage heat is **6.5 cents/kWh**.

### **Off-peak meter facility charge (\$4 per month)**

A \$4 facility charge will be billed for each off-peak meter. The off-peak facility charge is designed to help pay for the basic cost of providing off-peak electricity. The off-peak meter *must* be located outside the building.

### **Backup system replacement loans**

Off-peak heating loans can be used to replace a gas or oil backup system or for first-time conversions to electric off-peak heat. Qualifying members may borrow up to \$5,000 for up to five years at a 5 percent annual interest rate.

### **Energy Efficiency Incentives**

Red River Valley Co-op Power offers numerous residential and business incentives to members.

For a list of current incentives, please go to [www.rrvcoop.com](http://www.rrvcoop.com). Remember, certain criteria must be met in order for members to receive the rebate.

### **Off-peak metering option - CT metering**

Red River provides the off-peak meter. The member's electrician provides the socket and donut. If CT metering is chosen, Red River Co-op only allows two donut setups.

**To ensure the correct socket and donuts are used for CT setups, Red River will sell the CT six-jaw socket and two CTs directly to the consumer or contractor.** See page 5 for a CT wiring general diagram.

Questions about Red River's Programs? Your calls are always welcome.

**Wayne Tenneson** — Member Services  
Advisor: 218-456-2139 or 800-788-7784; Cell: 701-793-9633

**Paul Karsnia** — Master Electrician/Load Management Technician: 218-456-2139 or 800-788-7784; Cell: 701-793-9634

# Ripple Control Guidelines

## What is allowed on the OFF-PEAK Meter?

Primary electric heat loads capable of being ripple controlled:

- Resistive electric heat: Electric furnace, plenum heaters, baseboard, cove heaters, wall heaters, boilers, etc.
- Under-floor heat (slab storage heat) - If primary heat, should be a storage system with heating cables, pipes or panels in the sand at least 6 to 8 inches below the cement.
- Heat pumps - geothermal or air source
- Thermal storage heaters, storage furnaces & hydronic units

*The off-peak heating rate is only available during the heating season defined as the September through May usage periods. No off-peak rate is offered for the June, July and August unless you have a large capacity water heater on control. Then the air conditioner must be in the main service panel.*

## Which ripple controlled loads stay in the main panel – NOT allowed on the OFF-PEAK meter?

Water heaters may also be ripple controlled for an \$11 (80 gallon or larger) or \$4 per month credit (depending on the control strategy) if you have a ripple control in your home for off-peak heat. We recommend an 85 or 105 gallon water heater if you plan to have it ripple controlled.

## What about air conditioning?

Air conditioners are not ripple controlled and don't qualify for any special rates so they stay in the main panel.

*(If you are adding air conditioning, and you don't have room in the main panel, call Red River to get the OK to place it in the Off-peak panel. You still won't get the off-peak rate, because the off-peak rate is not available for the July, August & September billing periods)*

## Off-peak meters

Off-peak meters should be mounted on the outside of the building. Red River Co-op Power provides the off-peak meter, the off-peak customer's electrician provides the meter socket.

- CT metering: If the electrician plans to use CT metering, Red River Co-op only allows two donut setups. **Red River Valley will sell the CTs and six jaw socket directly to the consumer.**

## How are off-peak loads controlled?

**Resistive Electric Heat** - *Electric furnace, plenum heaters, baseboard, cove heaters, electric boilers, etc.*

- With automatic fuel back-up heat.
- Without back-up heat if furnace can be off for extended periods. For example: An electric furnace in a shop with no water

**Control:** Ripple controlled at peak times for extended periods of time. Annual control varies depending on weather and other economic factors. Estimated control time for winter is less than 225 hours. (There are about 6,500 hours in the heating season, which is defined as the October - June billing periods.)

## Under Floor Heat (Slab Storage Heat)

- **Control:** Currently cycled from November 1st through April 30th on a timed schedule. Goes off at 7 am - back on at 12 pm (off 5 hours), On from 12 pm to 5 pm (on 5 hours), Off from 5 pm until 11 pm (off 6 hours), On from 11pm until 7 am (on 8 hours). Each day: Off a total of 11 hours, and On a total of 13 hours. **Can be controlled up to 16 hours straight during peak times.**

Floors that are not designed to store enough heat to handle 11 hours of daily cycling or 16 hour straight control may be placed in a reduced control category at a higher cents/kWh rate. If this occurs, **all** electric heating loads on the off-peak meter will be placed on the higher rate.

We recommend that the heating cables, pipes or panels be placed in the sand at least 6 to 8 inches below the cement so a storage heat base is created.

**Heat Pump - Geothermal or Air source** (*Compressors & resistive heat controlled*)

- With adequate back-up heating system.
- Off-peak rate during heating months - regular rate during summer months (July - September)
- Control: Ripple controlled at peak times for extended periods of time.

**Thermal Storage Heaters (E.T.S.) used as back-up in all electric home**

- **Control:** Thermal Storage - Currently cycled from November 1st through April 30th on a timed schedule. 7 am OFF - 12 pm ON, 5 pm OFF - 11pm ON. Each Day: Off a total of 11 hours, and On a total of 13 hours. Can be controlled up to 12 hours straight during peak times.
- **Control:** Main Electric Heat - On at least 16 hours each day. Dropped over morning and evening peak periods, off up to four hours at one time; off up to eight hours a day.

**Thermal Storage Furnace or Storage Heaters as Main Heat Source**

- **Control:** Cycled from November 1st through April 30th on a timed schedule. Cycled the same hours as other Thermal Storage heaters. (see above)

**Water heaters**

- **Long Term (Cycled Control):** Cycled from Nov. 1 through April 30th on a timed schedule the same as floor heat. Then in the summer months, controlled only as needed.
- **Short Term Control:** The maximum control is 4 hours in a morning peak period and 4 hours in an afternoon/evening peak period. If you use a lot of hot water from about 6 am to 10 am or from 5 pm to 9 pm, you may want to install a larger than normal water heater (85 gallon or larger).



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# Adequate Backup Systems

## **Adequate backup systems are required for off-peak members**

The weather in the upper Midwest and future wholesale power market prices are two unknowns that affect the amount of hours, Minnkota Power Cooperative, Red River's wholesale power supplier, needs to control for off-peak electric heat. For the heating season, Minnkota estimates less than 300 hours of load control.

That's why to receive the off-peak reduced electric heating rate, Red River members **must** have a reliable, automatic dual fuel heating system in place and ready to use. An adequate backup system may be a fossil fuel furnace or an electric storage heater with an adequate amount of storage heat.

## **5% Loans**

Red River does offer members who qualify a loan of up to \$3,000 for up to five years to install or replace inadequate or failing gas or oil backup system, or convert to off-peak electric heat.

# Estimated Off-Peak Heating Costs

## **Annual heating costs**

Fuel Choice	Rate	Efficiency	Electric Cost	Control Hours	Backup Cost	Annual Cost
Air heat pump w/mod. plen	\$0.065/kWh	145%	\$919.37	115	*\$79.29 (propane)	\$998.66
Propane	\$2/gal	95%	NA	NA	NA	\$1723.74

## **Assumptions**

- Average 1,500 sq. ft. home
- 21,975 kWh/yr heating needs
- 8.8 kWh/hr average demand
- \$0.065 off-peak electric rate
- 3,413 Btu/kWh
- \*Propane \$2/gal @95% efficiency
- 75 million Btus required for heating season



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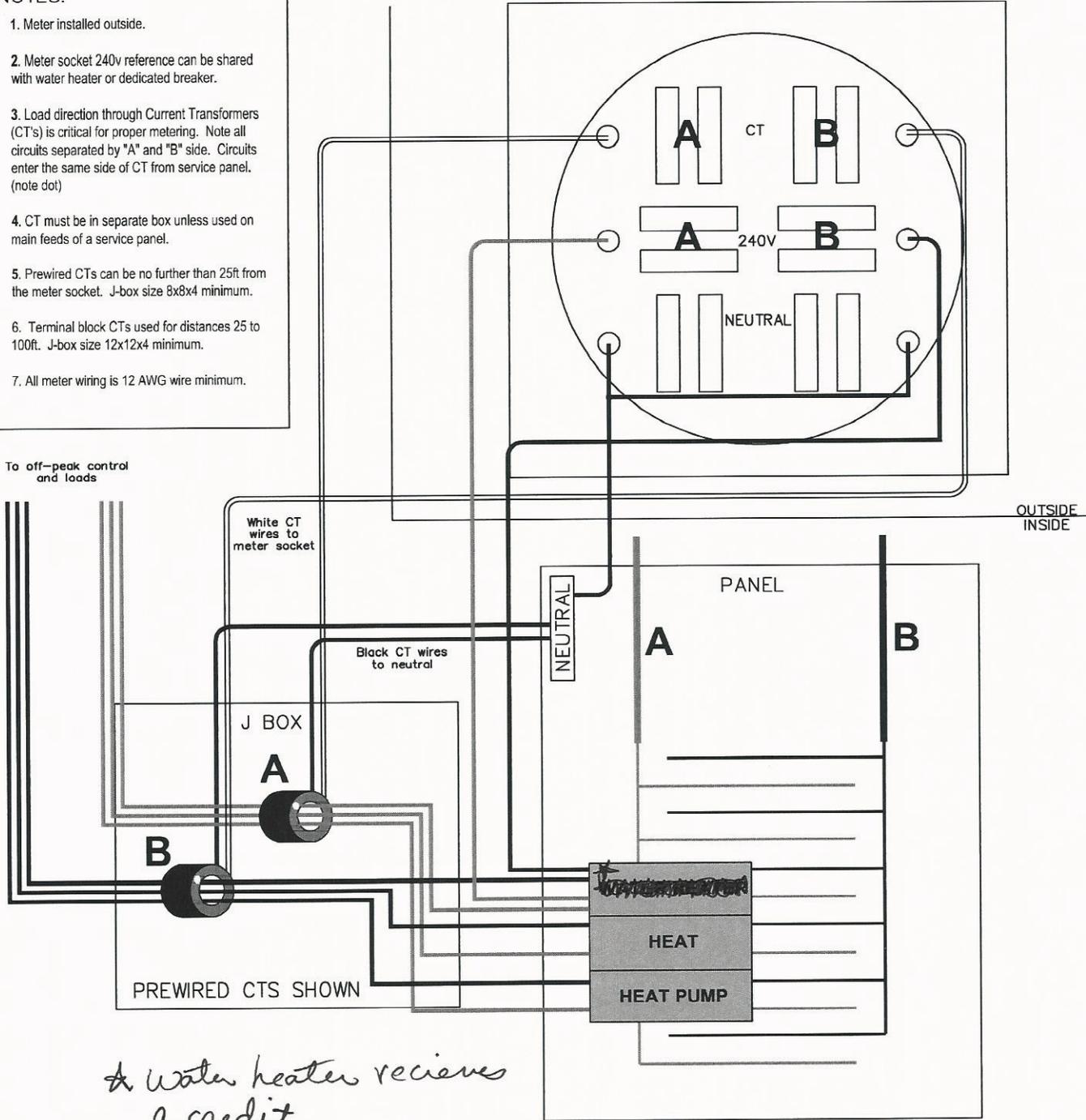
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# OFF-PEAK METERING 2 C.T. 6 TERMINAL SOCKET

**NOTES:**

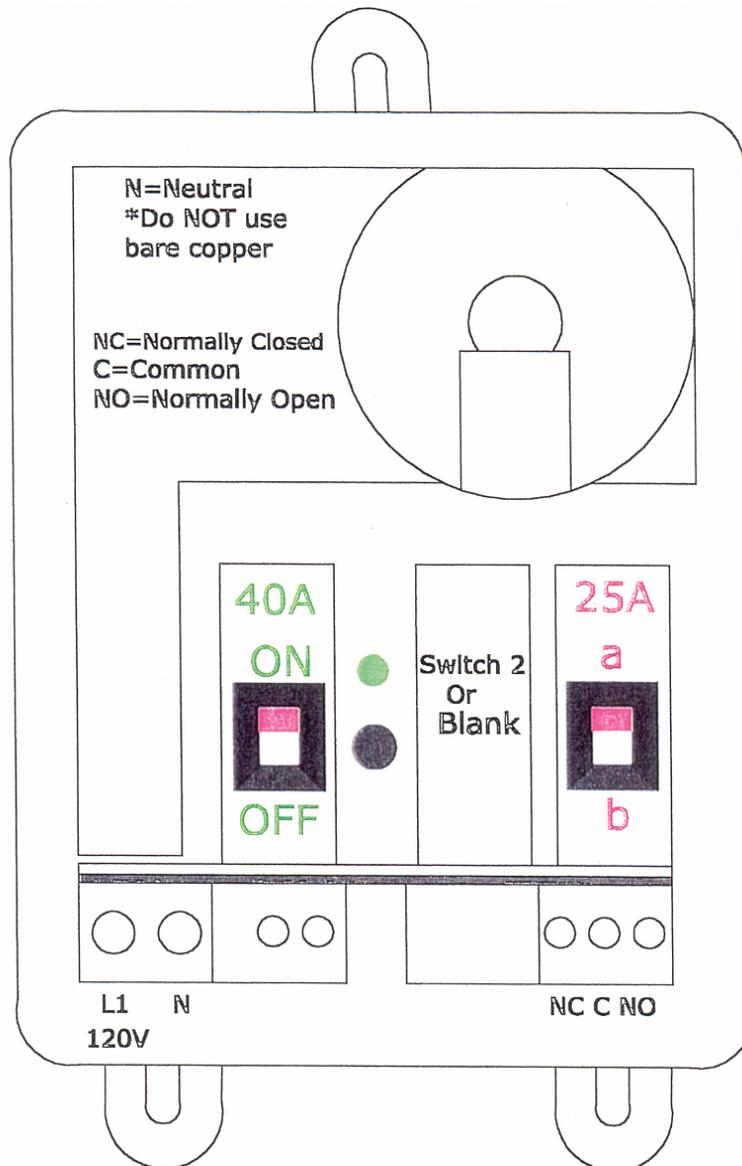
1. Meter installed outside.
2. Meter socket 240v reference can be shared with water heater or dedicated breaker.
3. Load direction through Current Transformers (CT's) is critical for proper metering. Note all circuits separated by "A" and "B" side. Circuits enter the same side of CT from service panel. (note dot)
4. CT must be in separate box unless used on main feeds of a service panel.
5. Prewired CTs can be no further than 25ft from the meter socket. J-box size 8x8x4 minimum.
6. Terminal block CTs used for distances 25 to 100ft. J-box size 12x12x4 minimum.
7. All meter wiring is 12 AWG wire minimum.



## C. T. METERING

DRAWN BY: NWL	DWG: OFFPEAK-04	REV BY: NWL
DATE: 3/20/03	SHEET 1 OF 1	REV DATE: 9/01/09

# RO and ROA Ripple Receivers



- L1 to be fed from non-dedicated circuit (lighting, refrigerator, etc.)
- 25A relays (RED switch) to be used for contractors, slave relays, and low voltage control wiring.
- 40A relays (GREEN switch) to be used for water heaters, heat circuits, etc. Red River requires only one leg to be broken with switch.
- Request appropriate switches (up to 3), all switches are interchangeable
- PLEASE NOTE: Normal off-peak position of switch is "a" or "ON" (Despite what schematic on ripple control denotes)
- RO receivers (pictured) are installed in a metal ripple enclosure.
- ROA receivers (not pictured) are also available – they don't require an enclosure.
- (Both the RO and ROA hold three switches (25 or 40A) that are all interchangeable)

# Heating

- What is “off-peak heat?”
- What are the benefits of off-peak heating?
- How does it work?
- Who else has off-peak heat?
- How do I get off-peak electric heat in my home?
- Off-peak heating options



## **What is off-peak electric heat?**

An off-peak electric heating system consists of an electric heat source as its main component and a back-up/supplemental heating source that will typically operate 200 hours per year during times of peak electrical usage.

## **What are the benefits of off-peak electric heating?**

Electric heat has always been the safest, cleanest and most efficient home heating energy source. Electric heat adds comfort to your home. With many heating options and products to choose from, you can put the heat where you need it.

By turning off the electric heat and switching to the backup system, Red River avoids paying peak demand charges for that electricity. These savings are passed along to off-peak consumers in the form of a low off-peak heating rate. Red River's off-peak heating rate is very competitive with petroleum fuels used for heating.

## **How does it work?**

System operators inside the Minnkota Power Cooperative energy control center monitor the regional power grid and make load control decisions 24 hours a day, 365 days a year. Off-peak heating loads are generally controlled during periods of peak electric usage – usually the coldest days of the year. Load control may also be influenced by the availability and price of electric energy in the wholesale marketplace.

## **Who else has off-peak heat?**

More than 1,800 Red River members have off-peak heating in their homes, shops or businesses. Their satisfaction is the best testimony to the merits of the program.

## **How do I get off-peak electric heat in my home?**

Your electrician and/or heating contractor does the actual installation of your system. Red River provides the ripple receiver and the off-peak meter. We will deliver your ripple near the start of your project. When your system is finished and ready for the off-peak meter, call us and ask for member services. We will install your off-peak meter and test your ripple to be sure it is operating properly.

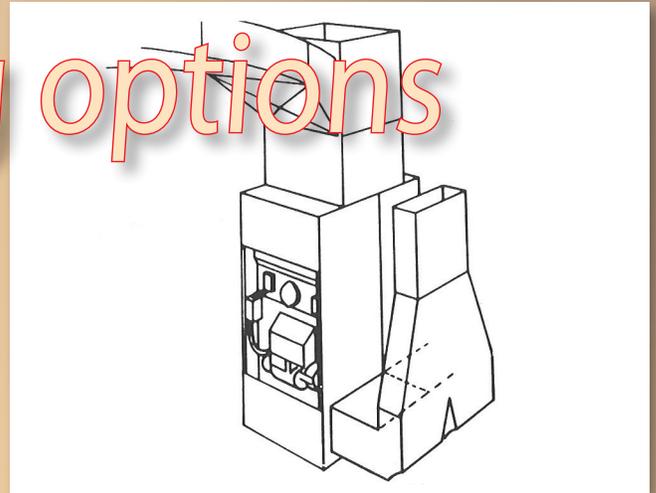
There are many options available for your off-peak heating installation. Red River's main requirement is a reliable and automatic backup system to take over when the electric heat is being controlled. There is a \$4 per month facility charge for each off-peak meter.

# Off-Peak Electric

# Heating options



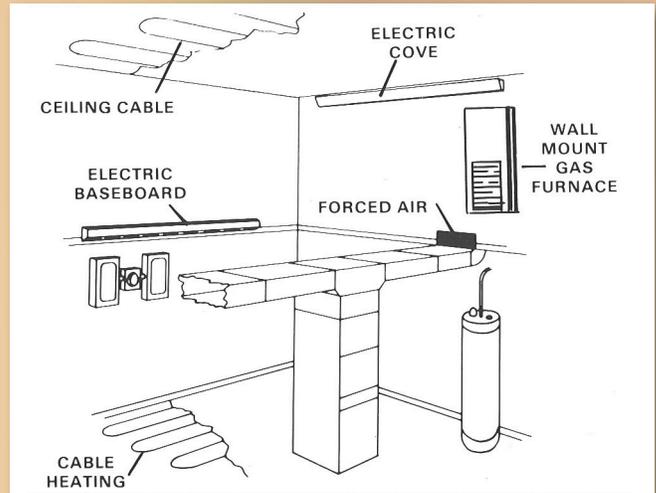
Electric plenum heater with oil or gas forced air backup



Electric furnace forced air with oil or gas backup (side-by-side) option



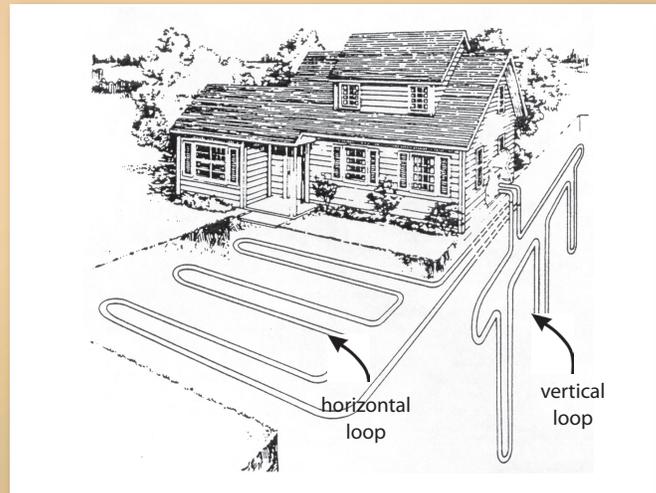
Electric boiler system with oil or gas fired boiler backup



Radiant electric baseboard, ceiling or underfloor heat with petroleum fuel forced air or wall mount backup



Electric thermal storage heater, storage furnace or storage boiler for off-peak heat in all-electric homes



Electric geothermal heat pump or air-source heat pump systems - 200-400% efficient - backup system required

## Comparative energy costs for space heating

Electricity (Cents/kWh)	Fuel Oil Regular Furnace (\$/Gal.)	Fuel Oil Super Efficient Furnace (\$/Gal.)	Propane Regular Furnace (\$/Gal.)	Propane Super Efficient Furnace (\$/Gal.)	Natural Gas Regular Furnace (\$/MCF)	Natural Gas Super Efficient Furnace (\$/MCF)
3.0	0.74	0.98	0.48	0.72	5.27	7.91
3.2	0.79	1.05	0.52	0.77	5.62	8.44
3.4	0.84	1.12	0.55	0.82	5.98	8.96
3.6	0.89	1.18	0.58	0.87	6.33	9.49
3.8	0.94	1.25	0.61	0.92	6.68	10.02
4.0	0.98	1.31	0.64	0.97	7.03	10.54
4.2	1.03	1.38	0.68	1.01	7.38	11.08
4.4	1.08	1.44	0.71	1.06	7.74	11.60
4.6	1.13	1.51	0.74	1.11	8.09	12.13
4.8	1.18	1.58	0.77	1.16	8.44	12.66
5.0	1.23	1.64	0.81	1.21	8.79	13.18
5.5	1.35	1.80	0.89	1.33	9.67	14.50
6.0	1.48	1.97	0.97	1.45	10.55	15.82
6.5	1.60	2.13	1.05	1.57	11.43	17.14
7.0	1.72	2.30	1.13	1.69	12.31	18.46
7.5	1.85	2.46	1.21	1.81	13.18	19.78
8.0	1.97	2.63	1.29	1.93	14.06	21.10
8.5	2.09	2.79	1.37	2.05	14.94	22.41
9.0	2.22	2.95	1.45	2.17	15.82	23.73
9.5	2.34	3.12	1.53	2.29	16.70	25.05
10.0	2.46	3.28	1.61	2.42	17.58	26.37

The above figures are based on the assumptions and formulas listed below.

### Formulas

#### Alternate fuel price to electric rate conversion formula:

$$(\text{Fuel Price}) \div (\text{Efficiency}) \times (341,300) \div (\text{Btu Heat Content}) = \text{Electric Rate}$$

*Example of \$0.72/Gal. Propane to Electricity with a Super Efficient Furnace:*

$$(0.72) \div (0.90) \times (341,300) \div (91,600) = 3.0\text{¢/kWh}$$

#### Electricity rate to alternate fuel price conversion formula:

$$(\text{Electric Rate}) \times (\text{Efficiency}) \times (\text{Btu Heat Content}) \div (341,300) = \text{Fuel Price}$$

*Example of 2.9¢/kWh Electricity Rate to #2 Fuel Oil with a Regular Furnace:*

$$(3.0) \times (0.60) \times (140,000) \div (341,300) = \$0.74/\text{Gal.}$$

### Fuel conversion chart

#### Propane – 91,600 Btu per gallon

Gallons	kWh at 60% Regular Efficiency	kWh at 70% Efficiency	kWh at 80% Efficiency	kWh at 90% Super Efficiency
1	16	19	21	24
100	1,610	1,879	2,147	2,415
500	8,052	9,393	10,735	12,077
750	12,077	14,090	16,103	18,116

#### Natural Gas – 1,000,000 Btu per MCF

MCF	kWh at 60% Regular Efficiency	kWh at 70% Efficiency	kWh at 80% Efficiency	kWh at 90% Super Efficiency
1	176	205	234	264
50	8,790	10,255	11,720	13,185
75	13,185	15,382	17,580	19,777
200	35,160	41,020	46,880	52,740

#### Fuel Oil – 140,000 Btu per gallon

Gallons	kWh at 60% Regular Efficiency	kWh at 70% Efficiency	kWh at 80% Super Efficiency
1	25	29	33
100	2,461	2,871	3,281
500	12,306	14,357	16,408
750	18,459	21,535	24,612

*Note: Electricity provides 3,413 Btu per kilowatt-hour.*

When comparing the price of off-peak electricity for heating to the price of alternative heating fuels, it is important to compare equipment efficiency, energy rates and monthly service charges.

The seasonal efficiency for electric heating systems ranges from 100-300 percent or more. The comparable efficiency for gas and oil heating systems ranges from a low of approximately 60 percent to a high of 95 percent. Most older gas and oil systems have an efficiency of 60 to 70 percent and most newer models have an efficiency in the 80 percent range.

Cost comparisons must also take into account actual energy cost and facilities charges or service charges that often are required by utilities.

An energy specialist from your local cooperative or municipal will be happy to help you sort out all the factors that should be considered in your energy cost comparisons.

How to compare cost

# Transformers, Disconnects, Metering

## **Three phase transformers**

For three phase services, a grade level transformer will be provided that puts out 120/208 or 277/480 “wye” voltage. Pole-mounted transformer banks for 120/240 “delta” voltage will not be provided unless absolutely necessary. If 120/240 voltage is required, an “open delta” two-phase service (two grade level transformers) will be considered, but limited to 100 HP capacity in most cases.

## **Metering**

### **Single phase**

All self-contained meter sockets (master and off-peak) are required to be lever bypass. For CT metering up to 400 amps, the CT’s can be located inside the grade level transformer, but limited to 3 secondary circuits out of the transformer. Any service over 400 amps must include a CT cabinet provided by the electrician and located near the grade level transformer. Red River will sell the CT’s and meter socket to the customer.

### **Three phase**

All self-contained meter sockets (master and off-peak) are required to be lever bypass. CT’s will not be mounted inside the transformer(s). CT metering must include a CT cabinet provided by the electrician and located near the grade level transformer. Red River will sell the CT’s and meter socket to the customer.

## **Disconnects**

Red River strongly recommends a disconnect at every service so it can be de-energized during emergencies or for changes and additions to the customer’s wiring. Red River’s crews are not normally available at a moment’s notice to disconnect a service.

## **Inspection**

As always, Red River will not energize a new or remodeled service until an inspection certificate has been provided. Faxing to Red River’s office is acceptable.

If you have questions about the above information, please contact **Engineering** at Red River Valley Cooperative Power Association.



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# Electric Service for Large Motor Loads

## **Electric service for large motor loads**

1. Any motor – single or three phase – over 10 HP may need “soft start” equipment to avoid voltage dips when the motors start, according to Cooperative policy.
2. The customer will be required to pay the cost of any special equipment necessary to maintain the Cooperative’s service reliability and integrity. This may include voltage regulators, filters for “harmonics,” power factor correction, and other devices.

## **Phase converts and large single phase motors**

Following are general statements from Red River Valley Cooperative’s consulting electrical engineers. Please discuss this information with your electrician and equipment supplier also. Our consultants recommend that you purchase from a supplier that has been in business for at least five years and that you look for a five year warranty.

1. **Static phase converters:** They are used by many suppliers, but they may not produce constant three phase power. They are less efficient and motors can only run at 2/3 their rated horsepower.
2. **Rotary phase converters:** They produce steady three phase and are therefore more efficient for operating motors. Motors can be used to their full horsepower and if sized properly, a rotary phase converter can run multiple motors. A good quality rotary phase converter can also provide “soft starting” for the motors.
3. **Variable frequency drives (VFDs):** One VFD is required for each motor. They are more susceptible to an impure voltage source. A VFD can provide a “soft start” for the motor it serves. A VFD or several VFD’s that are connected to 150 horsepower or more may cause harmonic voltage distortion which must be eliminated by filters at the customer’s expense.
4. **Written pole motors:** This type of single phase motor is very efficient and a site can have multiple motors. In general, they are more expensive than the other options. This type of motor does not need “soft start” equipment because of its low starting current.

## **Information needed to analyze large motor loads**

1. Number and size of motors
2. Manufacturer
3. NEMA code for the motor starting characteristics
4. When the motor will be running, how often it will be started and stopped

Your equipment supplier can help with the proper sizing of phase converters and VFD’s. If you have questions about the above information, please contact **Gary Shulstad** at Red River Valley Cooperative Power Association.

# Grade Level Transfer Switch

(WITH METER SOCKET)

Available to Red River Valley Co-op Power members at the following one-time lease payment:

	Price	Tax	Total
<b>200 Amp</b>	\$1,100	\$75.63	\$1,175.63
<b>400 Amp</b>	\$2,200	\$151.25	\$2,351.25

Plus additional materials if required. No circuit breaker or fuse included. Member's electrician may need to add circuit breaker or fuse. Includes 50 amp generator receptacle and cord end.

(Updated 3/27/2019)



**Transfer switch can be used as a service disconnect for a standby generator. Can feed up to two 250 MCM secondary circuits. Additional circuits require a secondary junction cabinet.**

Red River Valley Co-op Power's linemen make the appropriate connections to the Cooperative's lines. Member's electrician makes the connections to Member's lines. Member's electrician also installs the secondary junction cabinet if necessary.

The Cooperative will maintain this equipment at no charge for 5 years after date of installation except for overload, accidents, or vandalism. After 5 years, the Member must hire an electrician or the Cooperative to maintain, repair, or replace the equipment.

# Only Marathon offers the one thing you're looking for in a water heater...

## EVERYTHING.

- Lifetime limited tank warranty — 6-year parts warranty
- Highest energy efficiency rating with Envirofoam insulation
- Designed for easy installation

**Red River Valley Co-op members can purchase Marathon water heating directly from their electric cooperative. We carry 85 and 105-gallon water heats in stock. Call your member services department for details.**

### **Water heater rebates available for Red River Valley members only:**

- An incentive from the cooperative is available to members who agree to put their water heater on load control. See [www.rrvcoop.com](http://www.rrvcoop.com) for complete details and criteria.
- In addition, members who put their 80 gallon or larger electric water heaters on load control also receive a monthly credit.

