

**Water and Environmental Programs  
Engineering Success Stories**

**State:** Kansas

**Borrower Name:** Nemaha RWD #4

**Engineering Firm:** Bartlett and West Engineers, Inc.

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**Congressional Information:** Jim Ryun

**Counties:** Nemaha, Brown, Jackson

**Keywords:** Telemetry

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## **Use of Photovoltaics in Telemetry Systems**

Rural water districts usually choose a location for the water storage based on the elevation above the territory being served. This does not necessarily correspond in proximity to power lines. Nemaha Rural Water District No. 4 (RWD #4) has an elevated storage tank that is located about 2/3 of a mile from the nearest electrical service line. They needed to power a radio that will signal the pump (5 miles away) to turn on and off in response to the water level in the tower. The radio will use only a tenth of an amp when transmitting the signal periodically and for only a few microseconds. The total transmit time is a tiny fraction of the daily load. The bulk of this load powers the one amp required for radio stand-by. The daily load is only 24 amps at 12 VDC.

When RWD #4 approached the rural electric cooperative to see how much a line would cost they were quoted \$32,000. The district's board requested the REC to be released to approach KP&L for the service. KP&L's engineers said they could install the power line for approximately \$15,000. The monthly fee would be approximately \$125, or \$1,500 per year.

This is a remote location and a small unprofitable load. A bid of \$3,579 was solicited for a system that was conservatively designed for prolonged cloudy weather. The system was designed to allow for battery deterioration over the years and operation in cold temperatures where only a fraction of the nominal capacity of the bank would be available. The bank has four L-16 forklift batteries for a total capacity of 700 amp hours at 12VDC. The solar modules (154 watts in peak sunlight) were also oversized to allow rapid recharge from a few sunny days among up to two weeks of cloudy ones. The only expendable portion of the system are the batteries which, if well cared for, will last 7-10 years. The simple monthly cost of these would be about \$10 per month. Solar modules are available today with warranties up to twenty years. Even allowing conservative design for years of fool-proof operation, the decision to try photovoltaics at this point was quite safe. If the storage tank was located a greater distance from electrical service, a much greater savings would be realized.

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