## Energy Savings from Pump-Off Controllers in Oil Well Applications

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## **Project Description**

In 2010, the Southwestern Public Service Company (SPS, a division of Xcel Energy) Business Custom Efficiency Program (BCEP) was evaluated on behalf of the New Mexico Public Regulatory Commission. In this effort savings from pump-off controls (POCs) in oil well applications were evaluated, as it is a new control type becoming more prevalent in the oil pumping industry.

This poster presents evaluated savings from POCs in oil well applications. The measure is a sensor based control system with an adaptive algorithm that is designed to allow the pump to operate only during optimum pumping conditions, setting oil levels at which pumping is to start, stop, then resume once oil has replenished. In doing so, the control is designed to reduce head pressure, in turn also increasing pump filling and eliminating fluid pounding.

## **Evaluation Effort**

Performance of POCs was evaluated with a combination of pre- & post-retrofit metering and inspection of baseline settings. For the baseline, it is currently standard practice within the oil pumping industry to use sucker rod pumping units controlled by a timer based system. The time clocks are manually calibrated, causing pump jacks to shut down for a set period of time allowing oil to replenish back inside the well cavity.

On site, power was metered WattNode Pulse Loggers, as power factor is taken into consideration during the monitoring duration. Power factor is an important variable in pump monitoring as the instantaneous power factor varies according to the position of the sucker rod stroke. This is caused by the counter balance system not being perfectly balanced causing the primary driver to alternate from loaded to unloaded, during the sucker rod stroke. There was a parallel monitoring effort on a subsample of pumps, metering amps in a separate data logger metering amps and then using one-time readings of voltage and power factor, but when tested against direct kW metering this was shown to be insufficient for this application. In addition to this, inspections were conducted of 30 wells prior to retrofitting in order to better establish baseline settings for wells operating with timer controls.

## **Evaluation Findings**

A total of seven wells have had a combination of pre- and post-retrofit metering performed with an average savings of 1,733 kWh/HP and .19 kW/HP of the pump motor at an average nipple depth of 7,192 feet.