Energy Records Only

The two following calculations can be used to estimate water withdrawals based on records of electric or natural gas use by the well. The formulae assume that the well pump(s) are connected to a dedicated energy meter that reflects energy usage only for the well pump(s). In addition to energy usage, the calculations rely on knowing the depth of the well pump. Note that this will probably be less than the overall depth of the well. If you are unsure of this depth, you may contact your pump service company, or estimate based on knowledge of local water tables.

Calculate Using Only Electrical Energy Records:
Electric Well Pump

Lift Depth – Depth in feet from which well pump is pumping water.

Acre-foot (AF) – Unit of water measure equal to 325,851 gallons.

1.024 – kw/hrs needed to lift one AF of water one foot at 100 % efficiency.

.54 – Overall efficiency of electric well pump, expressed as a decimal.

$$\frac{1.024 \times \text{lift depth}}{.54} = \text{Kw hours of electricity needed to lift one acre-foot of water}$$

Example using a well with the pump set at 400 feet:
Uses 211,300 kw/hr of electricity, as shown through electric meter / billing records

$$\frac{1.024 \times 400}{.54} = 758.52 \text{ kw/hr of electricity used to pump 1 AF of water}$$

$$\frac{211,300 \text{ kw/hr}}{758.52 \text{ kw/hr/AF}} = 278.57 \text{ AF of water pumped}$$

Calculate Using Only Natural Gas Energy Records:
Natural Gas Well Pump

Lift Depth – Depth in feet from which well pump is pumping water.

Acre-foot (AF) – Unit of water measure equal to 325,851 gallons.

MCF – Million Cubic Feet (ft^3).

Therm – Unit of measure for natural gas equal to about 1,000 ft^3.

.00318 – MCF of gas needed to lift one AF of water one foot at 100 % efficiency.

10.68 – Therms / 1,000 ft^3 of gas.

.154 – Overall efficiency of natural gas pump, expressed as a decimal.

$$\frac{.00318 \text{ MCF} \times 10.68 \times \text{lift depth}}{.154} = \text{Therms of natural gas needed to pump 1AF of water from a known depth}$$

Example using a well with the pump set at 400 feet:
Uses 24,572.66 therms of natural gas, as shown through meter / billing records

$$\frac{.00318 \text{ MCF} \times 10.68 \times 400}{.154} = 88.21 \text{ therms of natural gas used to pump 1 AF water}$$

$$\frac{24{,}572.66 \text{ therms}}{88.21 \text{ therms / AF}} = 278.57 \text{ AF of water pumped}$$