
UT652.1207 State Supplement

(a) Energy Use Calculators

The national NRCS web site has several energy calculators available, they are located at:

<http://www.nrcs.usda.gov/technical/energy/index.html>

(b) Energy Use and Conservation

Energy loss from leaks does add up. As an example of the power cost caused by a leak, calculate the cost with and without the loss. Assume an electric pump with a total flow of 800 gpm and a head of 100 ft. The power required to pump this is:

$$Hp = Q \text{ gpm} * \text{Head ft} / 3960$$

$$Hp = 800 \text{ gpm} * 100 \text{ ft} / 3960$$

$$Hp = 20.2$$

The pump efficiency varies by flow rate and manufacturers. The pump curve for the make and model would be the first source of this. Assume the overall efficiency of the pump and motor is 70%. This means that the horse power needed at the pump would be:

$$Hp_{\text{required}} = 20.2 / 0.70$$

$$Hp_{\text{required}} = 28.86$$

Assuming the system operates for 1500 hours during the season the hp-hrs would be:

$$Hp\text{-hrs} = 28.86 * 1500$$

$$Hp\text{-hrs} = 43285.7$$

To convert to Kilowatts multiply the Hp-hrs by 0.746. The Kw-hrs would be:

$$Kw\text{-hrs} = 43285.7 * .746$$

$$Kw - \text{hrs} = 32291.1$$

The location is a site with energy costs of 0.04 \$/kw-hr.

The annual cost to operate the pump would be:

$$\text{Seasonal cost} = 32291.1 \text{ kw-hr} * 0.04 \text{ $/kw-hr}$$

$$\text{Seasonal Cost} = \$ 1291.65$$

Now if there was a leak in the system that is flowing at a rate of 8 gpm (1% of the total flow), what would the increase in seasonal power cost be?

The increase in pumping cost would be 1% of 1291 or \$12.91. This is fairly small, but 8 gpm is a very tiny leak. The point is that even a small flow adds up, over the time of irrigation per season. Depending on the overall leak amount, there could also be a loss in distribution uniformity in the irrigation system resulting in a decrease in crop yield and/or quality.

Monitor the irrigation during the season to determine changes in the flow. This could be done with a flow meter, pressure gauge, or if necessary, the power meter. Reading changes with any or all of the above would show potential leaks or plugging of nozzles or outlets.