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*For more information, or  
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improvements on your farm  
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# Energy Efficient Farms: Pump and Motor Systems



Motors on farms account for approximately 18% of farm energy use. Farms utilize pumps and motors for an almost limitless amount of applications – from pumping water for irrigation to moving grain to keeping barns well ventilated. Increasing the efficiency of each of these applications, if small when viewed in isolation, can add up to significant energy efficiency improvements. Experts estimate that basic maintenance and upkeep can improve your motor and pump performance by 30%.

## Additional Facts:

- Motors and pumps placed into operation are often unnecessarily large for their job. It doesn't help to have a large motor running slowly for a small job. Motors should operate at a load between 65% and 100%. A motor running below this capacity is too large and is likely wasting energy.
- When looking at replacing old motors around the farm, high efficiency electric motors provide the best bang for your buck. While they may cost a bit more initially, their higher runtime efficiency (3-8% better) will more than pay you back for your investment. These motors are especially economical for situations in which a motor will be running for a high number of hours per day.
- Despite highly desirable efficiency savings, if a motor only runs a few hours a year, it may not be worth investing in a completely new motor system. However, keep in mind that repairing a motor will often decrease its efficiency by at least 2%.

## Utility Rebates

**Motor incentives are usually given on a “per horsepower” basis.**



**Utilities will consider the net efficiency gain in replacing an old motor with a new one, including typical run time and mechanical efficiency gain.**

## Low Cost Preventative Maintenance

Keep belts tightened with the appropriate tension. If a belt is too tight or too loose, your energy efficiency can drop by 20%.

Additionally, cogged v-belts increase motor efficiency even more, by up to 5%



Use totally enclosed motors whenever possible, to prevent dirt and dust from wearing down your system unnecessarily.

## Variable Speed Drives

Numerous conversations with a wide span of utility officials have revealed that variable speed drives are one of the best ways to save energy on farms with intensive motor or pump requirements. In a nutshell, installing a variable speed drive (VSD) to a motor allows that motor to scale its work rate up or down based on the amount of load required at any given time over the span of a task. This sits in contrast to traditional drives, which require a motor to run at the highest work rate the motor may ever need.

By allowing the motor to run at “variable speeds” a VSD can reduce energy expenditure by 50%, or sometimes more. The cost of VSDs has also been significantly reduced in recent years, and with a rebate from your utility, will often pay itself back within one to three years.

## Additional Resources

### When to Replace Farm Motors

See: <http://energy.cas.psu.edu/motors.html>

### Farm Motor Efficiency

See: [http://www.extension.org/pages/Energy\\_Efficiency\\_of\\_Electric\\_Motors\\_on\\_the\\_farm](http://www.extension.org/pages/Energy_Efficiency_of_Electric_Motors_on_the_farm)

### Energy Efficient Farm Equipment

See: [http://www.agenergysolutions.org/site/index.php?page\\_id=178](http://www.agenergysolutions.org/site/index.php?page_id=178)