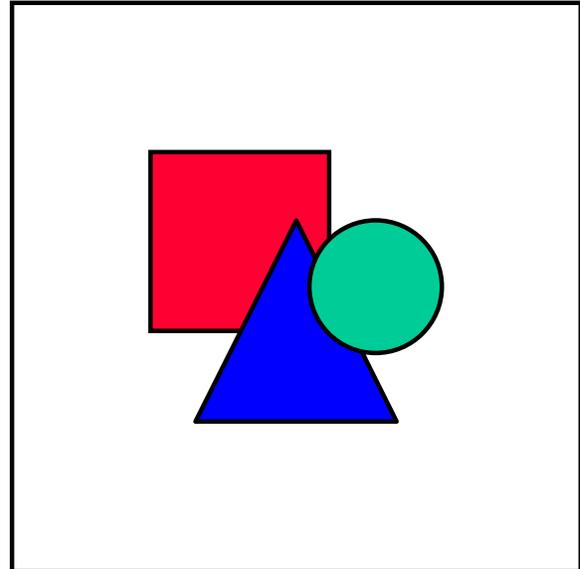


ENERGY-EFFICIENT MOTORS

Energy-efficient motors, also called premium or high-efficiency motors, are 2 to 8% more efficient than standard motors. Motors qualify as "energy-efficient" if they meet or exceed the efficiency levels listed in the National Electric Manufacturers Association's (NEMA's) [MG1-1993](#) publication.

Most general-purpose motors sold after October 1997 must meet the NEMA definition, according to federal law. However, motors that exceed these standards are readily available. Recommendations on efficiency levels that exceed the standards can be obtained for a given motor size from the [Consortium for Energy Efficiency](#).

Energy-efficient motors owe their higher performance to key design improvements and more accurate manufacturing tolerances. Lengthening the core and using lower-electrical-loss steel, thinner stator laminations, and more copper in the windings reduce electrical losses. Improved bearings and a smaller, more aerodynamic cooling fan further increase efficiency.



USE IN THE WATER/WASTEWATER TREATMENT PROCESS

Pump and blower motors account for 80 to 90% of the energy costs in water supply and wastewater treatment facilities, and the lifetime energy costs to run a continuous-duty motor are 10 to 20 times higher than the original motor purchase price. Thus, energy-efficient motors can play a major role in reducing facility operating costs.

Energy-efficient motors should be considered for all new installations, replacement of failed motors, or as spares. They are frequently a cost-effective alternative to rewinding, and are sometimes an economic substitute for well-functioning motors in high-duty applications. However, in cases where the faster speed of the energy-efficient motor results in higher energy use without adding to the useful work performed, the energy-efficient motor may not be an economic option. A cost comparison will determine if a motor replacement is cost effective, and an analysis of the whole system--including the driven process, drive train, and controls--can reveal if other changes could provide greater benefits.

BENEFITS

Energy-efficient motors generally have longer insulation and bearing lives, lower heat output, and less vibration. In addition, these motors are often more tolerant of overload conditions and phase imbalance. This results in low failure rates, which has prompted most manufacturers to

offer longer warranties for their energy-efficient lines.

Purchasing an energy-efficient motor can dramatically cut energy costs. For example, purchasing the energy-efficient version of a 25 horsepower, 1800-rpm, totally enclosed, fan-cooled 460-volt motor that runs 16 hours per day at 75% load will save \$600 per year over a standard motor at an electrical rate of \$0.10 per kilowatt hour. With a cost premium of \$378, the simple payback is less than eight months.

Substituting the same energy-efficient motor for a standard motor due for rewind at a cost of \$700 would save \$710 per year, for a payback of slightly more than one year. When calculating operating costs for rewind motors, subtract 1 to 2 percentage points—or more if the motor has operated for many years—from comparable new motor efficiency ratings. If the same energy-efficient motor were to replace a working standard motor, the payback lengthens to 3.3 years.

PERFORMANCE HISTORY

Energy-efficient motors have a strong track record of high performance, with proven lower failure rates. As with all motors, materials and components can degrade during repair and rewind, reducing the original efficiency level. Insisting that the motor repair shop adhere to recommended quality standards can help maintain motor efficiency at or near original levels.

Many water/wastewater agencies are installing energy-efficient motors as part of a cost savings program. [Encina Wastewater Authority](#) estimates that it saves \$15,000 annually using energy-efficient motors. The [Moulton Niguel Water District](#) specifies energy-efficient motors for all motors in new construction and for replacements.

