Industry facts

- Over the past ten years, industrial electricity rates have risen an average of 9.7%. Looking at past history, this rate will only continue increase as time progresses.¹
- Electric drive systems represent almost two-thirds of the industrial power demand.²
- End-users spend $565 billion per year on electricity used in electrical drive and motor systems. By 2030, that could rise to $900 billion.³
- 54% of engineers say they routinely oversize motors. Oversizing motors results in permanent energy inefficiency that costs over the lifespan of the drive system.⁴
- Both political pressure and customer pressure continues to increase on companies to reduce their carbon (CO₂) footprint.

What do these facts mean for me?

Looking at rising energy costs and the fact that electric drives use such a large portion of industrial power, it is apparent that companies can see the greatest return on their energy saving strategies by transitioning to energy-efficient drives.

Energy efficient drive systems can assist companies in a number of ways. First, they help to reduce production and operating costs due to lowered energy usage. Second, they improve the return on investment compared to their mechanical counterparts. And finally, they lower CO₂ emissions, allowing companies the additional benefit of being environmentally conscious.

One aspect worth remembering when choosing the right drive technology; All three of the benefits listed above consistently occur over the entire operating life of your equipment, providing a continual return on investment.
Life cycle versus procurement costs

In typical drive systems, operating costs account for 97% of the life cycle costs of a motor, of which energy costs are generally the highest cost factor. Enormous potential for savings is just waiting to be harnessed.

Despite the fact that most costs occur later, it is usually the initial procurement cost that tips the decision in favor of a particular drive technology. But it makes better business sense to consider the entire life cycle cost of drive technology systems. Compare and contrast conventional technology with energy-saving systems and one thing will soon become clear; the higher initial outlay for energy-efficient drives is generally recovered within a few months or years, and operating costs are dramatically cut; not only with respect to the energy costs but also in other areas like maintenance.

Pumps, fans, and compressors – The biggest savers

The biggest potentials for savings with energy-efficient drive technology systems are offered by pumps, fans, and compressor systems that are still operated with mechanical throttles and valves. Mechanical control methods have many hidden disadvantages. For example, the motor runs continuously at the designed speed generally required for the maximum output rate, which is rarely needed in practice. Additionally, the throttles and valves waste energy and cause high temperatures and vibration levels which can have a negative impact on the drive and operation. Variable-speed drives with inverters offer a more economical alternative for a number of reasons: They can be controlled more quickly and more precisely, by adapting the flow rate directly to actual requirements, therefore, less energy is wasted and savings of up to 60% – in extreme cases even up to 70% – can be achieved, especially in energy-intensive applications.
**Estimate Your Annual Energy Savings**

### Mechanical throttle fans
The example below assumes four mechanical throttle fans running during a 1st and 2nd shift (16 hours per work day).

<table>
<thead>
<tr>
<th>4 mechanical throttle fans</th>
<th>45 kW</th>
<th>180 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Per fan</strong></td>
<td><strong>Total wattage</strong></td>
<td></td>
</tr>
<tr>
<td>180 kW</td>
<td>45 kW</td>
<td></td>
</tr>
</tbody>
</table>

**Energy usage**

- 180 kW Total wattage
- 320 hours One month: 1st/2nd shift
- 57600 kWh Monthly energy usage

**Cost Calculation**

- 57600 Kwh Monthly energy usage
- 6.92 cents Average electricity rate
- $3985 Monthly energy bill

**Yearly energy bill**

- $47,820 yearly energy bill

### Energy-efficient VFD fans
The example below assumes replacing the mechanical throttle fans in example #1 with energy-efficient VFDs.

<table>
<thead>
<tr>
<th>4 VFD fans</th>
<th>18 kW</th>
<th>72 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Per fan</strong></td>
<td><strong>Total wattage</strong></td>
<td></td>
</tr>
<tr>
<td>72 kW</td>
<td>18 kW</td>
<td></td>
</tr>
</tbody>
</table>

**Energy usage**

- 72 kW Total wattage
- 320 hours One month: 1st/2nd shift
- 23040 kWh Monthly energy usage

**Cost Calculation**

- 23040 Kwh Monthly energy usage
- 6.92 cents Average electricity rate
- $1594 Monthly energy bill

**Yearly energy bill**

- $19,128 yearly energy bill

**Yearly energy savings**

- $28,692 yearly energy savings

### Payoff period
The above example of $28,692 yearly savings utilizes four basic 60 HP SINAMICS G120E drives at approximately $6,500 per drive ($26,000 for four drives). This results in a payoff of only 11 months. Such a quick return on investment means that upgrading to energy-efficient VFDs makes perfect financial sense in similar situations.

### Conclusion
As energy prices continue to rise, it is important for companies to develop strategies that cut energy usage and reduce operating expenses. Because drive systems account for such a high portion of industrial electrical usage, transitioning to energy efficient drives is the perfect route to take. Depending on project specifics, companies can generally see a return on investment (ROI) between six months and two years for pumps, fans, and compressors that utilize a mechanical throttle or valve. For applications that already use a lower-efficiency VFD, the ROI does lengthen to one to three years. But nevertheless, investing in energy-efficient drives makes economic sense for the vast majority of companies looking to curb their energy usage.
Sources

1. U.S. Energy Information Administration
4. Engineers Split on Motor Oversizing, Automation World, May 2014
5. Energy-efficient Drives, Siemens, 2009