

Industrial Energy Savings Potential in New Construction

The design stage is critical for incorporating reliable and maintainable energy-efficient systems in new plant construction. The first, essential task is to develop a set of energy-efficient guidelines for equipment specifications that call for efficiently matching varying loads and that specify operations and maintenance requirements.

Purchase decisions should then be based on which equipment provides the best economic value over its useful lifetime. Key steps:

- Evaluate the lifetime operating cost of a purchase.
- Ask suppliers for energy-efficient options.
- Establish procedures that incorporate energy efficiency into daily operations.
- Purchase equipment with nationally recognized energy saving designations, such as ENERGY STAR products and National Electrical Manufacturers Association (NEMA) Premium motors.
- Review and update your purchasing guidelines annually.

Recommended technologies for implementing energy efficiency in new plant construction include:

- Install high efficiency lighting equipment.
- Procure high-efficiency motor and drive equipment.
- Insulate equipment and pipes.
- Establish equipment specifications that match estimated loads.
- Install controls and energy management systems.

Be sure to research newer technology as well. One example is membrane technology. Membranes represent an exciting alternative to traditional separation technologies, which are among the most energy-intensive industrial processes. Membranes can be used to treat wastes, recover products as mundane as salt or as precious as silver, purify chemicals, produce corn syrup, or concentrate orange juice — all at higher quality while using less energy and producing less pollution than conventional processes.

The following sample of energy-saving measures, which have been implemented in a variety of plant venues and industry segments, show the significant efficiencies that you may be able to attain in your new manufacturing plant.

Sample Specification Description	Annual Energy Cost Savings (\$/year)	Implement Cost (\$)	Payback (Years)
Motors			
Install wastewater treatment pumps with high efficiency motors	\$188,000	\$71,000	2.2
Purchase a high efficient motor (96%) over a standard 86% efficient motor	\$3,400	\$6,120	1.8
Compressed Air Systems			
Install engine driven compressor	\$75,000	\$150,000	2.0
Utilize buffer tank to regulate compressor duty cycle	\$5,000	\$15,000	3.0
Recover heat from compressor for preheating	\$3,000	\$5,000	1.7
Repair compressed air leaks	\$22,414	\$800	0.0
Steam Systems			
Use economizer to preheat boiler feedwater	\$84,500	\$1,500	0.1
Install automatic boiler air/fuel ratio controls	\$33,580	\$25,000	0.7
Process Cooling			
Install closed loop cooling water system (cooling tower)	\$15,000	\$25,000	1.7
Install variable speed pump drive to optimize flows	\$12,000	\$20,000	1.7
Optimize chiller plant capacity (based on a typical 4000 ton chilled water distribution system)	\$401,095	\$0	0.0
Process Heating			
Install melting furnace heat recovery system	\$378,000	\$450,000	1.2
Install a direct fired heating system	\$1,253,000	\$1,839,000	1.5
Cogeneration			
Install combined thermal energy and power production system	\$150,000	\$600,000	4.0