# Energy Efficiency Opportunities at Wineries

Summary

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Wu, Y.Y., et al., 2013 “Energy Efficiency Opportunities in Wineries for Retrofit and New Construction Projects,” https://oaktrust.library.tamu.edu/handle/1969.1/149174?show=full

# Demand ( kW or KVA)

Every piece of electrical equipment at wineries requires electrical power to work.

Demand is the total electrical power used by an equipment at any one time on site and is measured by a Load Serving Entity in kVA (kilo-volt-amps)

# Consumption (kWh)

When an equipment consumes power, and  it is measured in kWh (kilo-watt-hours) and is equivalent to power consumed in 1 hour.

# Energy Consumption at Wineries

- Refrigeration Systems
- Process Equipment
- Water Heating
- Wastewater Treatment
- Lighting

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# Refrigeration:

- Generally small/medium wineries use central refrigeration system to support the process cooling loads for the entire facility. Small- and mid-size wineries generally use freon refrigeration systems.
- The large wineries may have multiple refrigeration systems that are dedicated to various applications, such as tank farms, barrel rooms, and cooling.
- Most refrigeration applications are fermentation, cold stabilization and cold storage/aging.
- In winemaking, the fermentation temperature and fermentation duration depend on the type of wine to be produced.
- White wine is fermented at lower temperature resulting in more fruitiness taste and it requires longer fermentation period. The level of dry wine (without residual sugar) also determines the fermentation period.
- Red wine making fermentation takes place between 75 and 80 °F for seven to ten days. For white wine the fermentation takes seven to twenty-eight days usually between 48 and 60 °F.
- Modern wine making utilizes stainless steel tanks as the most common fermentation vessels. Cooling is achieved by jackets, external or internal heat exchangers .

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# Refrigeration Energy Savings:

- Insulate tanks
- Utilize Variable Frequency Drive (VFD) controlled compressor
- Sequencing the refrigeration compressors
- Utilizing High efficiency refrigeration compressors
- Interconnecting individual refrigeration systems to minimize number of compressors
- Enable air economizer free cooling
- If using glycol for cooling, raise its temperature when not cold stabilizing

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# Process Equipment

- De-stemmers
- Crushers
- Presses
- Pumps
- Clarification centrifuges

Winery process loads fluctuate depending on the amount of grape/wine being processed, and it is recommended to install variable frequency drives (VFD) to control the speeds of process equipment, such as must transfer pumps, screw presses.

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# Water Heating

- Boilers – Install high efficiency boilers
- Steam boilers
- Water heat exchangers
- Recover waste heat from refrigeration systems

Avoiding steam cleaning  and switching to hot-water is going help wineries to use less energy.

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# Lighting

- Replace the High Intensity Discharge (HID) Lighting with High Intensity T5
- Replace T12 fluorescent lighting with T8 fluorescent lighting
- Replace 32-Watt T8 lamps with 28-Watt T8 lamps
- Replace HID and fluorescent lightings with LED or induction lighting
- Install automatic lighting controls

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# Other Energy Efficiency Opportunities

- Install Premium Efficiency Motors
- Replace Standard V-Belts with Cog-Type Belts
- Repair Compressed Air Leaks
- Replace Compressed Air Jets with High-Pressure Blower
- Reduce Air Compressor Discharge Pressure
- High Efficiency Pumps
- Insulate Chilled Water Lines
- Insulate Glycol Storage Tanks
- High Efficiency HVAC Units
- VFD Controlled Hot Water Pumps

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