Efficiency Vermont, Technical Assistance, and You: Worthy Projects, Incentives, and Free (to you) Support Systems

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Introduction to BetterBev Technical Assistance

- A multi-region collaboration of EPA Pollution Prevention (P2) grant recipients across New England and the Southeast
  - Supporting craft beverage manufacturers in their sustainability efforts at no cost
  - Aiming to set new standards for environmental responsibility and consumer satisfaction
- Focused on:
  - Source reduction
  - Systemic changes over one-off efforts
  - Continuous improvement
  - Cross industry collaborations and capacity building
  - Low cost, low tech, accessible, practical solutions
  - Knowledge sharing between manufacturers, incentive bodies, vendors, and regulators
  - Service learning opportunities and internships for students
- Offering recognition to high performers
  - Realistic expectations and thresholds, meeting manufacturers where they are

How BetterBev Can Help You Access Incentives

- Identify what is possible before spending enough money to warrant an incentive
- Review project ideas through a “bang for your buck” lens
- Review processes to identify improvement opportunities
  - Energy (both heating fuel and electricity)
  - CO2
  - Water and wastewater
  - Solid waste
- Benchmarking support, including data input and bill review
- Process and incentive research and grant/incentive application support

BetterBev Recognition

Points based assessment form covering 10 criteria:

- Environmentally responsible sourcing
- Water usage
- Wastewater reduction
- Stormwater management
- Energy efficiency and conservation
- CO2 use and emissions
- Cleaning and sanitizing, including safer cleaning practices
- Waste reduction
- Packaging format and materials
- Environmental culture

30% of total points warrants recognition and gains:

- Access to logo
- Certificate of recognition
- Addition to recognition map
- 3rd party validation

Efficiency Vermont Overview

Patrick Haller
Engineering Manager

Efficiency Vermont

Who we are

- Statewide energy efficiency utility
- Reduce the cost of energy for all Vermonters
- Help families, businesses, and institutions understand and make better use of energy and reduce greenhouse gases

Efficiency Vermont

Others to help

- Vermont Gas Systems (If you use natural gas)
- Burlington Electric (if in Burlington)
- BetterBev
- Your local electric company
- DOE Onsite Technical Assistance Partnership
- Many others

Efficiency Vermont

What we do

- Direct support through incentives, training, and technical advice
- Market transformation through supply chain engagement
- Partnership with energy providers

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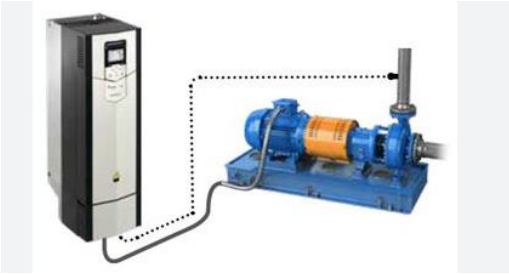
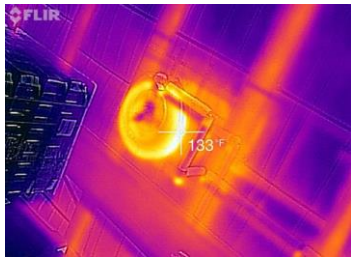
More of what we do

- Help cover the cost between standard and efficient equipment
- Help Identify Upgrades
- Coordinate with partners
- Reduce greenhouse gases

- **Call us and we'll connect the dots!**

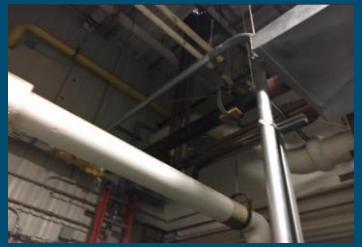
Efficiency Vermont





Examples of Common Opportunities

15 Feet of Un-insulated steam pipe, savings, $860 a year!; cost $350

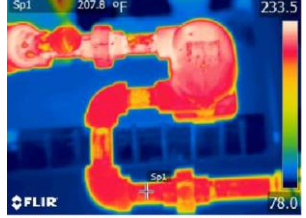


Use an IR camera to see losses from Un-insulated steam pipe

Draining Condensate

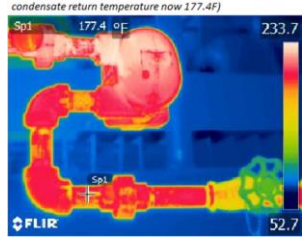
Keg washer, Draining Steam Condensate

Use an ultrasonic leak detector to find compressed air leaks
(can find CO2 and Nitrogen too!)



Above: Steam trap failed open (note condensate return temperature is 207.8F)

Below: Replacement steam trap operating properly (note condensate return temperature now 177.4F)



Replace Compress Air Timed Drain with a No-Loss Drain.
Cost: $200,
Annual Savings = $200

Efficiency Vermont

Efficiency Vermont and Vermont Gas Systems Supported Energy and Conservation Efforts at Black Flannel

- High efficiency glycol chiller with hybrid refrigeration technology
  - Essentially 2 chillers in one for redundancy
  - Much smaller than suggested by contractor – sized using available guidance from MBAA
- Walk in coolers use high efficiency glycol evaporators
  - Fewer refrigerated units plus fans that shut off when not called for
  - Draft lines also cooled by bigger system
- Full burner modulation on steam boiler
  - Fewer boiler cycles
- Variable Frequency Drives (VFDs) on ALL process pumps
- Dimmable LED lighting throughout site
- Weatherized and insulated building
- VFDs and smart thermostats on HVAC equipment
- New Project: Hot water reclamation

Where and Why VFDs?

- 8 process pumps and 3 motors equipped with VFDs between brewery and distillery
  - Easier to work with – can align motor to load rather than use a valve as a throttle
  - More efficient – lower draw on motor = less electricity used to run
  - Longer motor life
- Most processes require 5-50% of motor capacity, with some requiring short busts (5-20 mins) of 80% capacity

Additional Energy and Conservation Efforts at Black Flannel

- Glycol piping plumbed with Cool-Fit ABS
  - Washdown rated and fully sealed
- Shared process equipment for brewing and distilling
- Hot and cold liquor tanks
  - Allows for the capture of thermal energy and more efficient knockouts
- High strength wastewater sent to anaerobic digester
- Full composting program
- PakTech reuse program
- Nitrogen generator
- Recycling program includes: green banding, label backing, stretch film, and grain bags.

A Note on Pipe Insulation

- Cold pipes:
  - Condensation and ice are a clear sign of energy waste
  - **Water has a 20x higher thermal conductivity than air & Ice has a 100x higher thermal conductivity than air**
  - Use foam insulation and tape seams. Do not use fiberglass!
- Hot pipes: Harder to see the loss, but very costly
  - Use fiberglass insulation on steam pipes and tape seams. Do not use foam!
  - Use blankets on traps and other items that you need to have access to
  - Foam insulation is typically rated to 200F, so fine for hot water loops

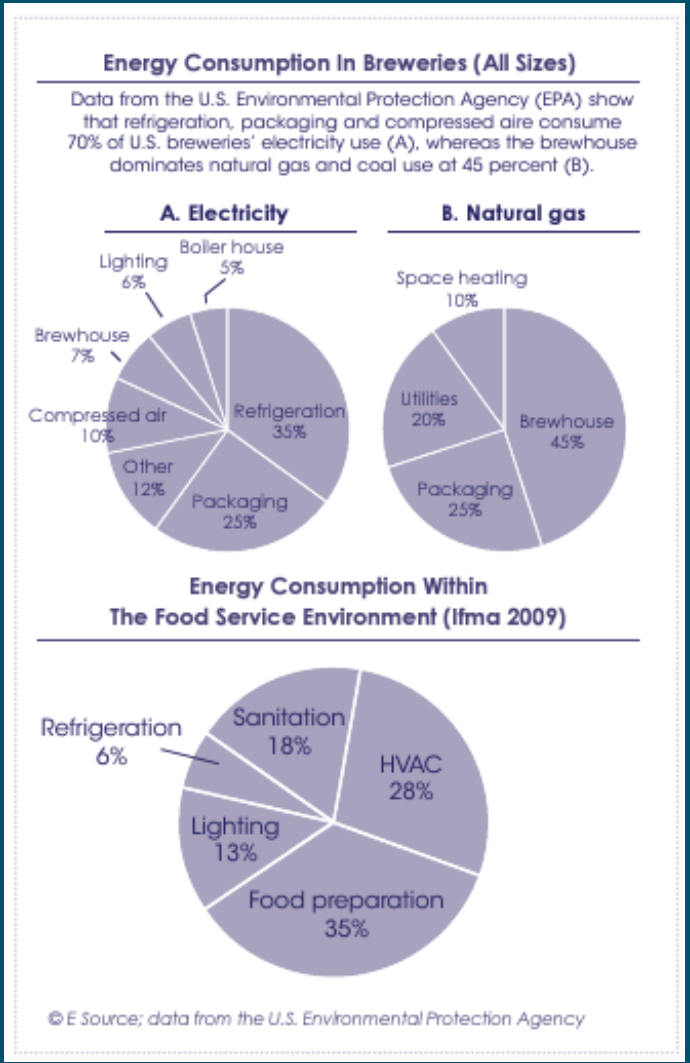
Energy Systems in a Brewery

Highest Uses of Gas

- Brewhouse
- Packaging
- Utilities
- Space Heating

Highest Uses of Electricity

- Refrigeration (chillers/coolers)
- Packaging
- Compressed Air



Electrification - What to Keep in Mind

Vermont is the only state in New England that has chosen not to restructure its electric industry by adopting retail competition
*Net metering is allowed

Service Type: Will determine how you are billed and whether you pay a higher rate during peak hours or a peak demand charge

Peak Hours: Hours when rates (kWh) are highest

- Vary depending on provider

Peak Demand: The highest use for 15 minutes at any point in time during a billing cycle

Efficiency comprises over 15% of VT's electric portfolio, delivered at 75% of the cost of purchasing new power.

15.1%

Percentage of Vermont's 2020 electric needs met by efficiency

5.6¢/kWh
Cost of saving electricity with efficiency

VS

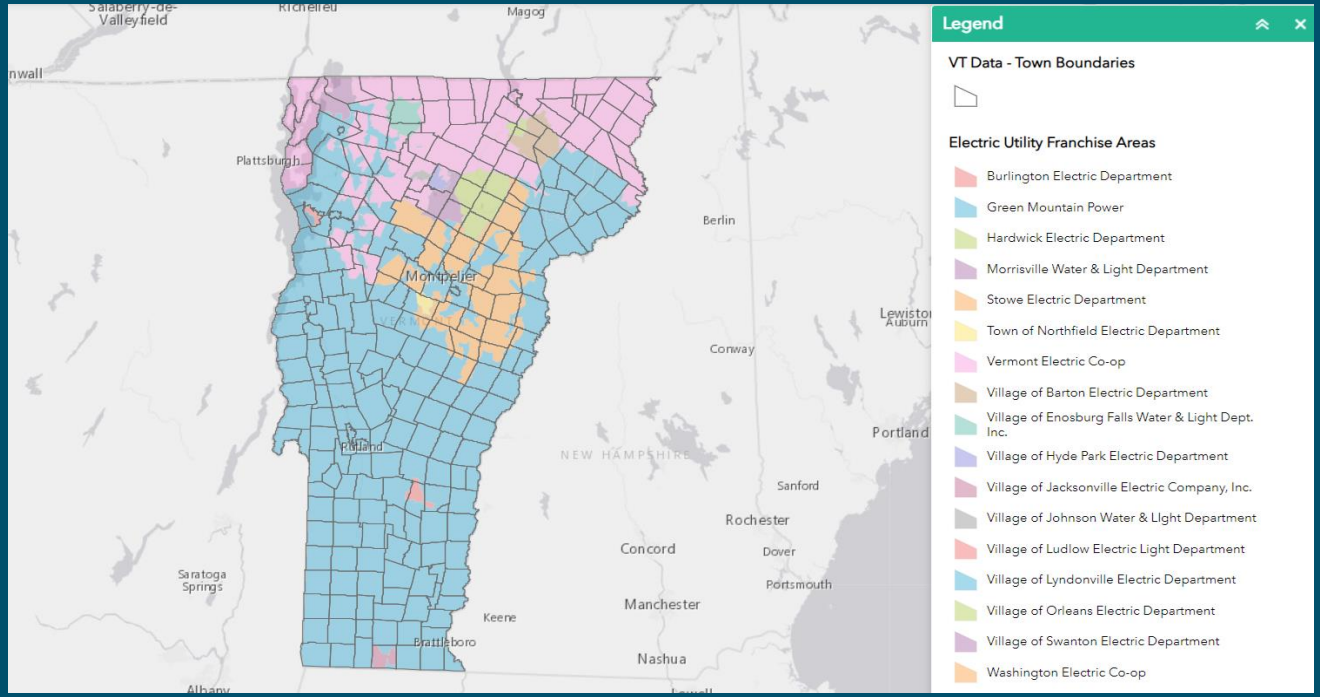
7.4¢/kWh
Cost of supplying electricity

$12.96/MMBtu
Cost of saving fossil fuel with efficiency

VS

$23.52/MMBtu
Cost of supplying fossil fuel

Electrification: Important for CO2 savings, but …know your rates!



https://vtpsd.maps.arcgis.com/apps/webappviewer/index.html?id=9f9b060d475d4ed49795fdd98aa895fc

Example General Commercial Rate

AVAILABLE:

Throughout the Company's service territory.

APPLICABLE:

Except as noted below, service under this rate is available to all Customers, except that this rate is not available to any Customer with a measured demand of 200 kW or more recorded during any billing month or whose average consumption during any four consecutive months is greater than 7600 kWh per month. Customers whose consumption meet or exceed those levels will become ineligible for this rate and will be transferred to Commercial and Industrial Time-of-Use Rate 63/65.

EV CHARGING EQUIPMENT EXEMPTION:

The 200 kW and 7600 kWh service limitations for this rate schedule shall not apply where all service is restricted to electric vehicle charging station equipment available to the general public. GMP reserves the right to modify this exemption via future tariff filing to provide for curtailment of charging equipment at expected peak times if the usage level warrant it.

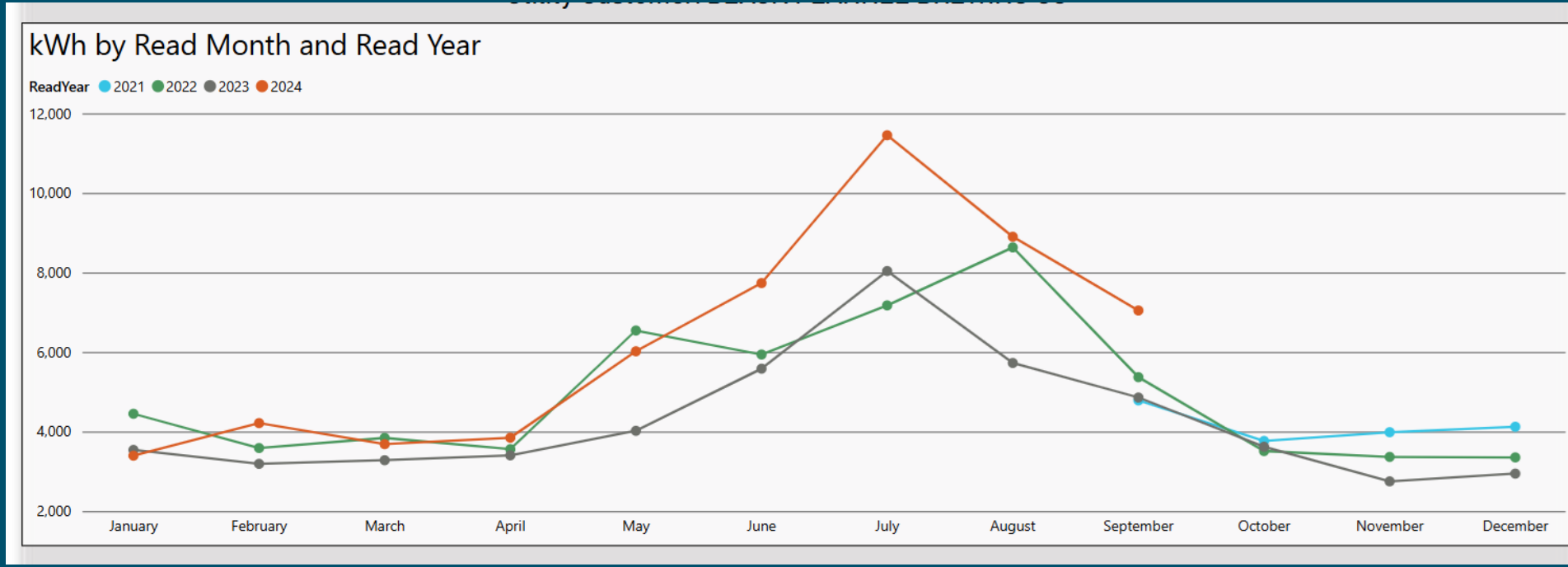
RATES:

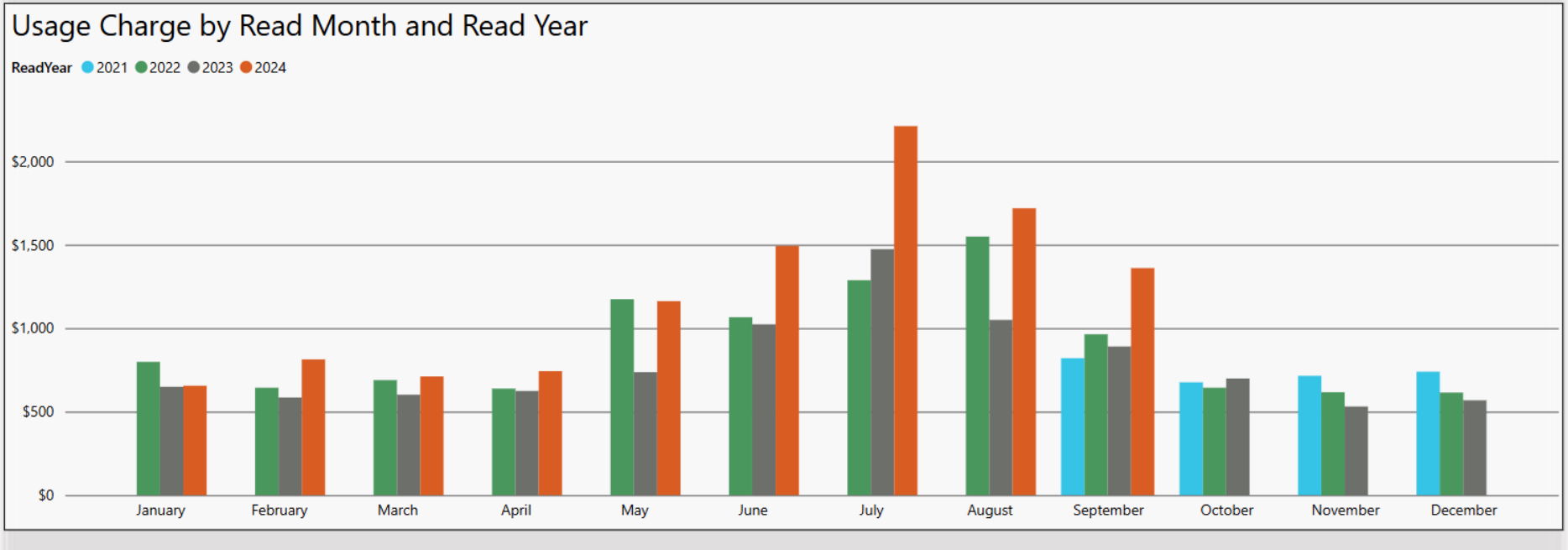
Customer Charge	kWh Charge
$0.726 per day	$0.20321 per kWh

Example Monthly Usage

3 months consecutive over 7600 kWh

(almost 4 - was 7,044 kWh in September)




Usage Charge by Read Month and Read Year
ReadYear
2021
2022
2023
2024
$2,000
$1,500
$1,000
$500
$0
January
February
March
April
May
June
July
August
September
October
November
December

Time of Use Rate

RATES:

Daily Customer Charge	$4.721
Peak kW	$18.574
OffPeak kW	$5.348
Peak kWh	$0.13106
OffPeak kWh	$0.09960
Primary Voltage Discount	4.00%
Sub-Transmission Voltage Discount	21.65%
Sub-Transmission Voltage Discount>20MW	23.04%
Transformer Ownership Credit	($0.9979)

ADJUSTMENT:

This rate schedule is subject to adjustment.

PEAK HOURS:

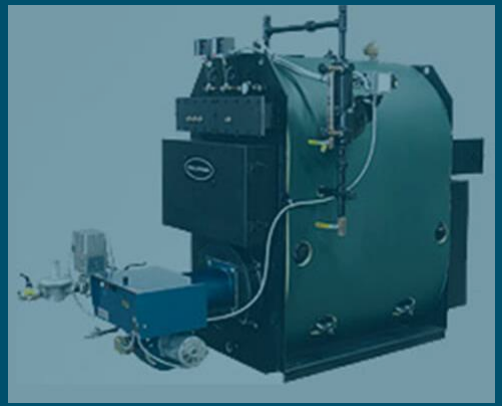
Peak hours shall be a period of 16 consecutive hours selected by the Company between the hours of 6:00 a.m. and 11:00 p.m. on weekdays (Monday through Friday). All other hours are considered off-peak.

BILLING DEMAND:

When the rates for billing demand are differentiated by peak and off-peak hours, the demand in kilowatts will be the greater of the following:

Peak Hours:

A number of kilowatts equal to the greatest fifteen-minute peak occurring during the peak hours during such month; but not less than 50% of the highest fifteen-minute peak occurring during the preceding eleven months' peak hour periods.



Example, replace 30 Boiler HP with Electric Steam Generator

Time of Use Rate + Demand Charge

30 Boiler HP is…34.5 lb/hr/bhp x 970 btu/lb = 1,003, 950 Btu/hr

At 3,412 Btu/kWh =>294.24 kW

Demand charge (Power) = $18.574/kW

294.24 x $18.574 = $cost every month
5,465 demand

$65,580 Annually, Demand Only
Then Add Energy Cost (kWh)!

Infrastructure

Suppose single phase, 240v

Power (single phase) = volts x amps x power factor
Assume power factor =1

Amps = Power/Volts =
(294kW x 1000W/kW)/240volts
Amps = **1,225 Amps**

For 480 3phase ~ 350 Amps
Power =Volts x Amps x sqrt(3) x pf

Thank you! Questions?

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