

Division of Water and Audits (DWA)



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Water-Energy Nexus

California Public Utilities Commission

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Water-Energy Nexus

- **Transparent – Visible**
- **Quantifiable – Measured – Recorded**
- **Accounts for Demand Reduction and Energy Savings**
- **Verifiable – Continuously Monitored**

Water-Energy Nexus

Phase I – OEEP Results in Demand Reduction and Reducing Energy Loss

Phase II – Demand Load Shifts to Reduce Peak Demand

Phase III – Self Generation to Increase Reliability and Support Electric Grid System

Defining Loss For Pumping Systems

Water-Energy Nexus Goals:

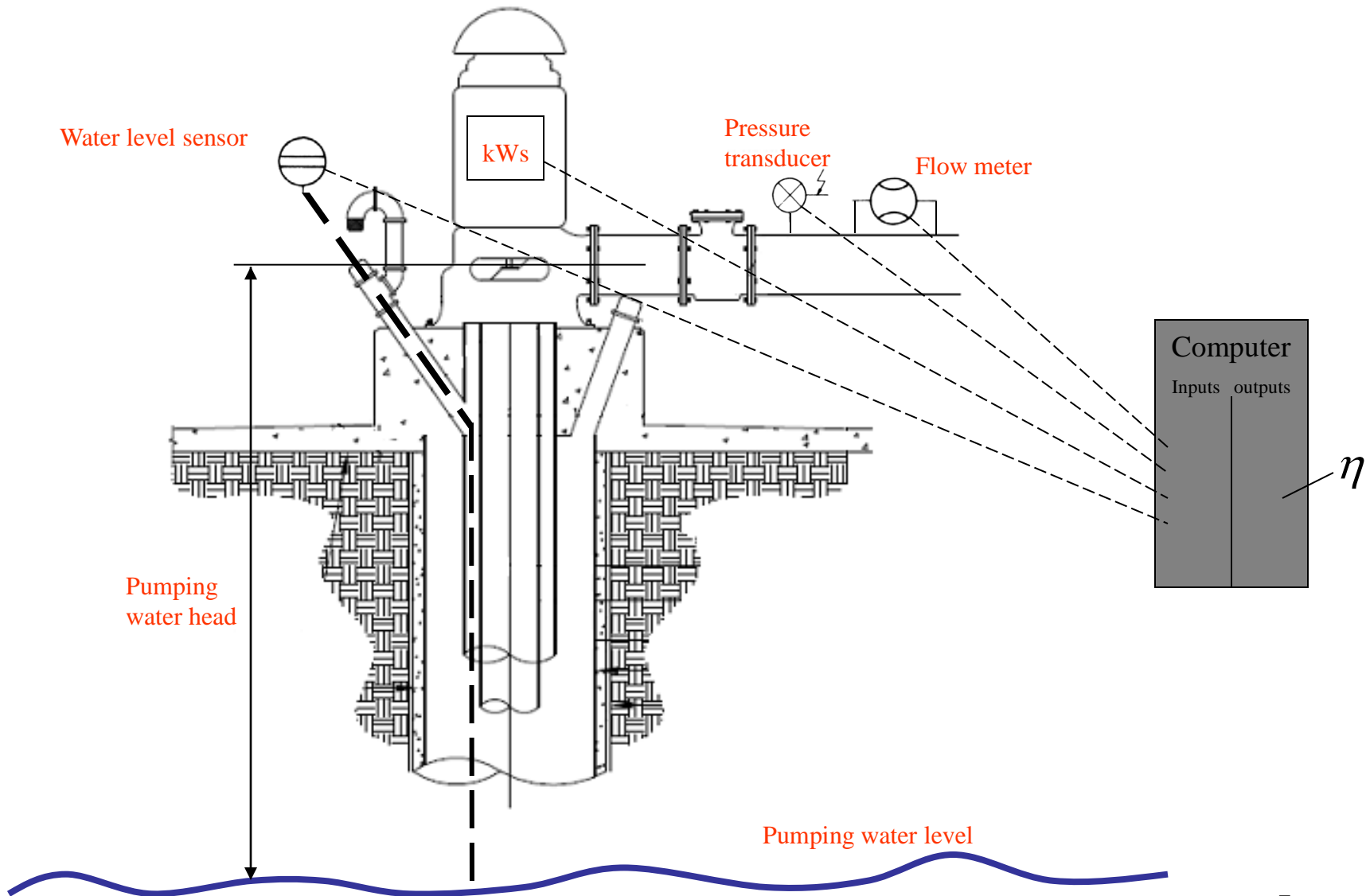
Phase I – Reduce 10% in Loss

Power and Energy

Phase II – Reduce 10% in Demand Reduction

Phase III – Provide 10% in Generation to
Utilities

Pump and Motor System



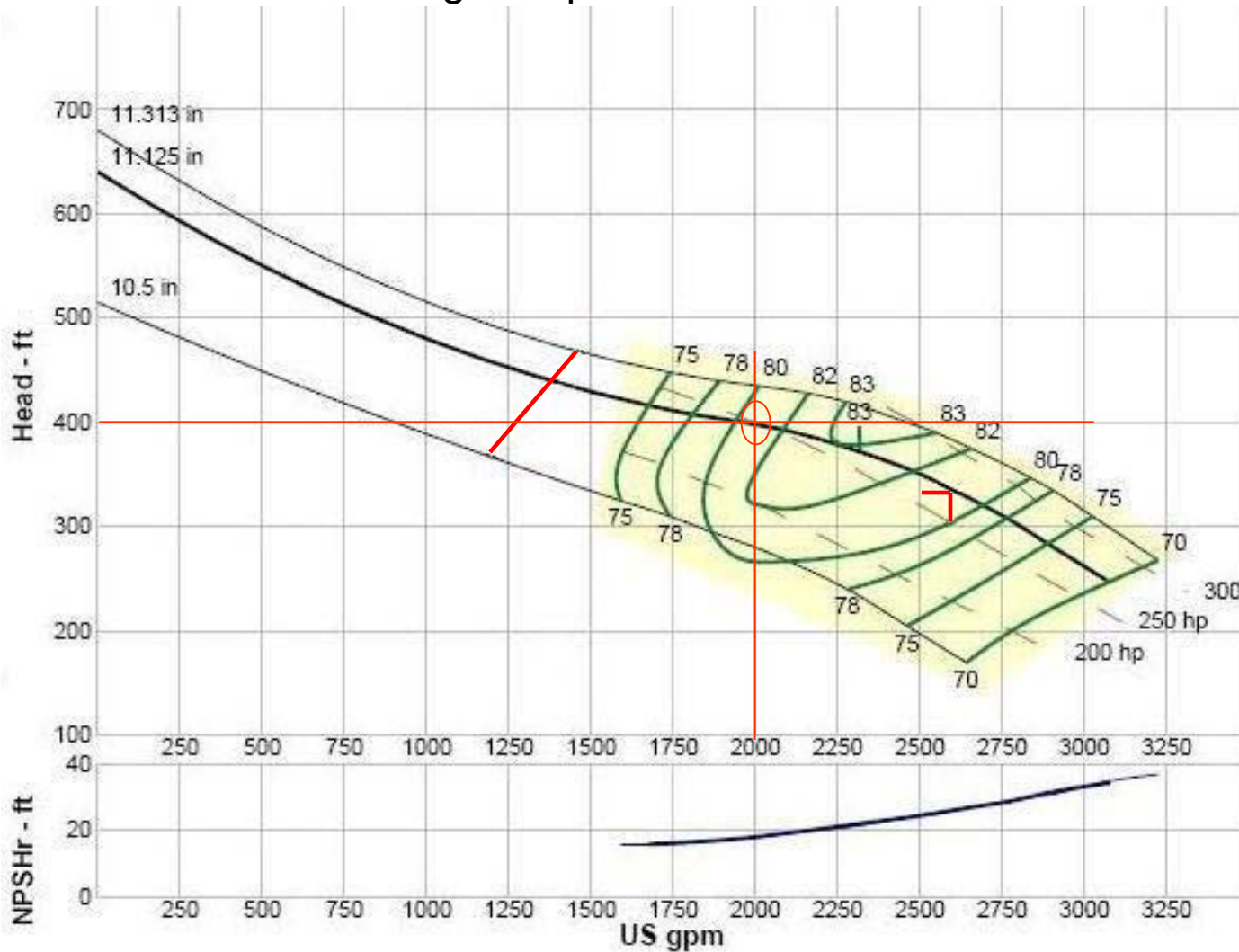
OPERATIONAL ENERGY EFFICIENCY PROGRAM (OEEP)

Step 1. Energy required to operate the existing pump and motor **without** variable horsepower drive.

Step 2. Energy required to operate **with** variable horsepower drive **programmed to operate at optimal efficiency**

Pump Efficiency Curve

1. The installed operating point
2. The current operating point
3. Plan to achieve through Step 3



STEP 1

VOLTS

460.0 V

CURRENT

362 A

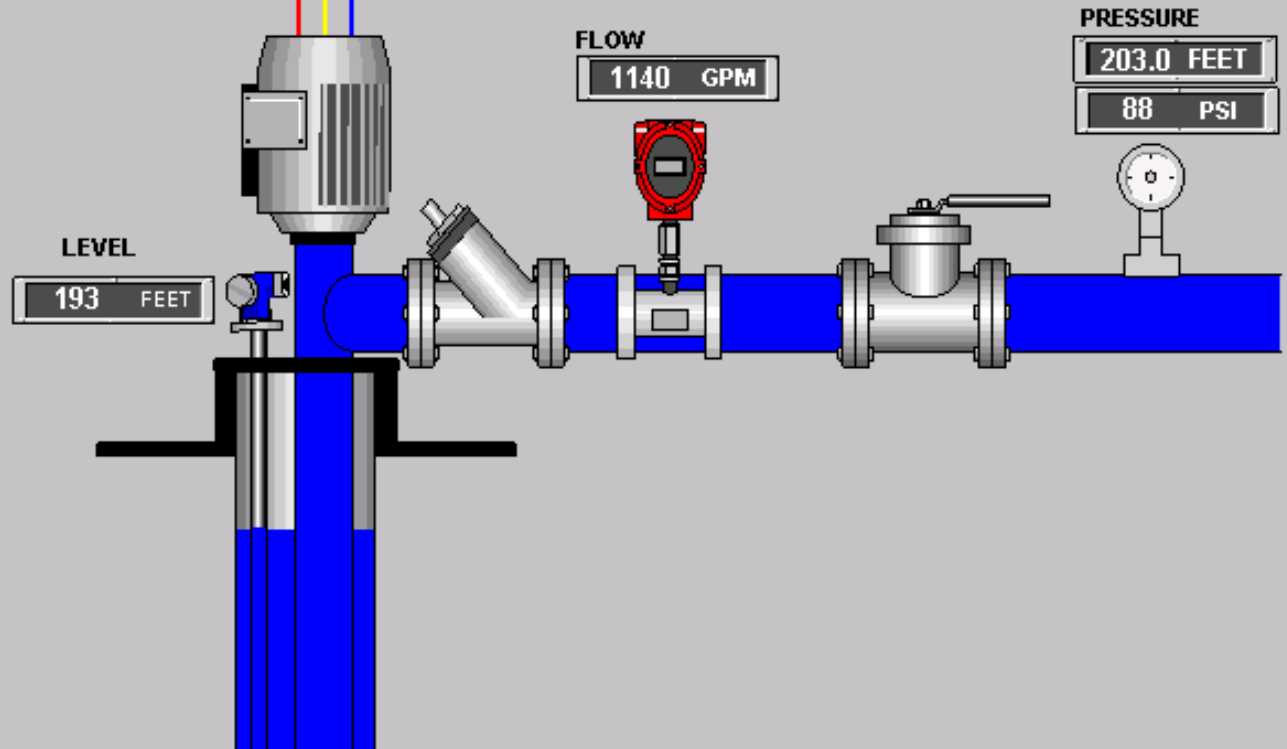
POWER FACTOR

76.0 %

Power monitor



KVA Demand 288.4
Efficiency (%): 39.1
KVA Saved 0.0
KW Loss 132.0



OUTPUT HP 114.0
INPUT KW 217.0
OUTPUT KW 85.0

STEP 4

VOLTS

475.2 V

CURRENT

266 A

POWER FACTOR

90.9 %

Power monitor



KVA Demand **219.0**
Efficiency (%) **73.5**
KVA Saved **69.0**
KW Loss **53.0**

FLOW

1839.91 GPM

PRESSURE

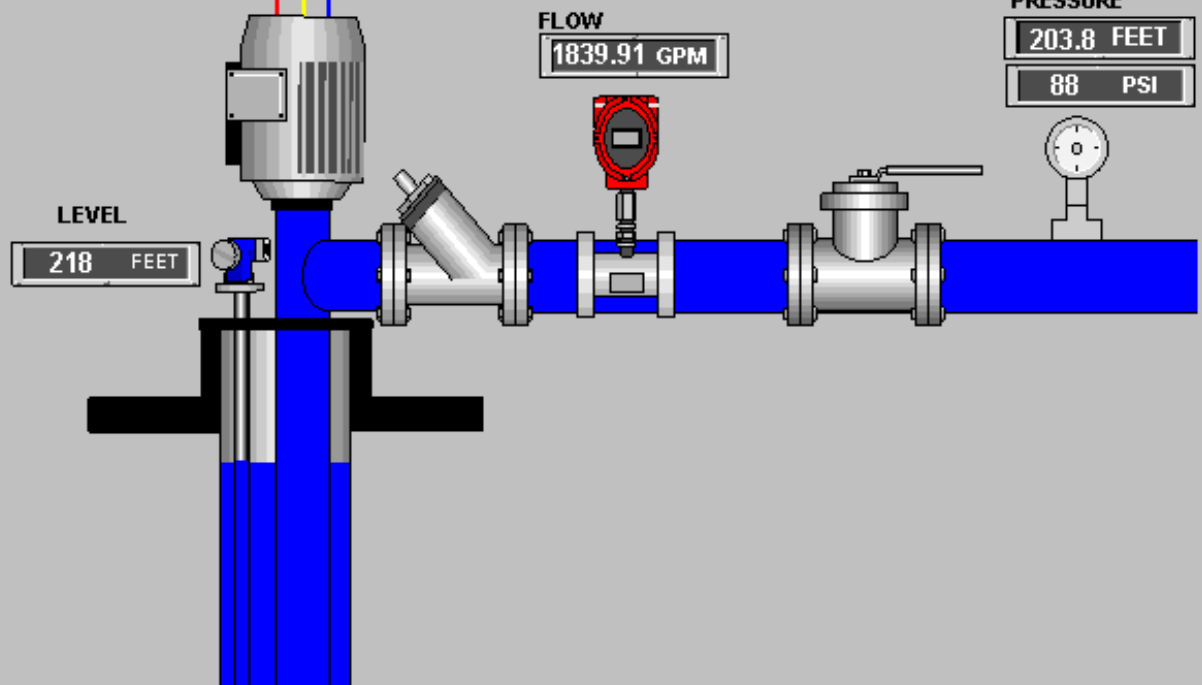
203.8 FEET

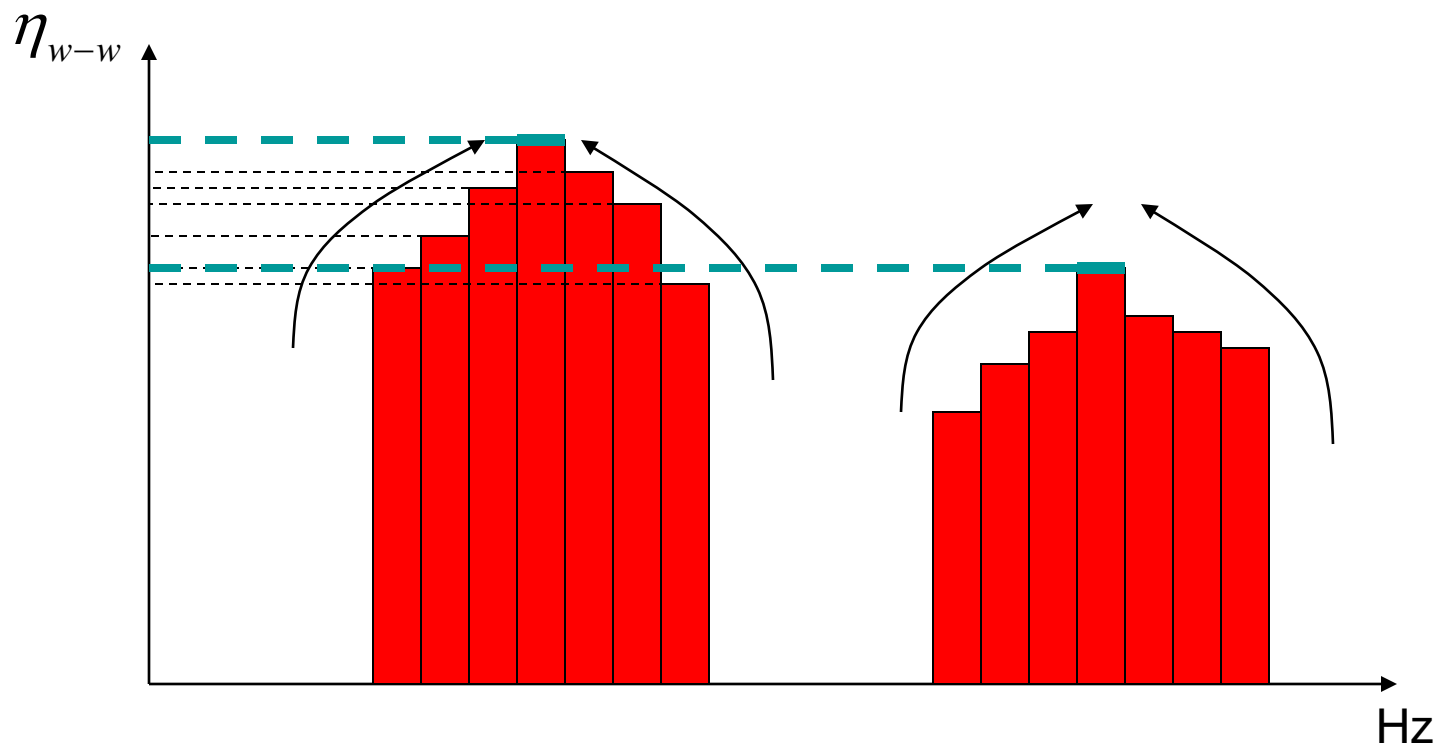
88 PSI

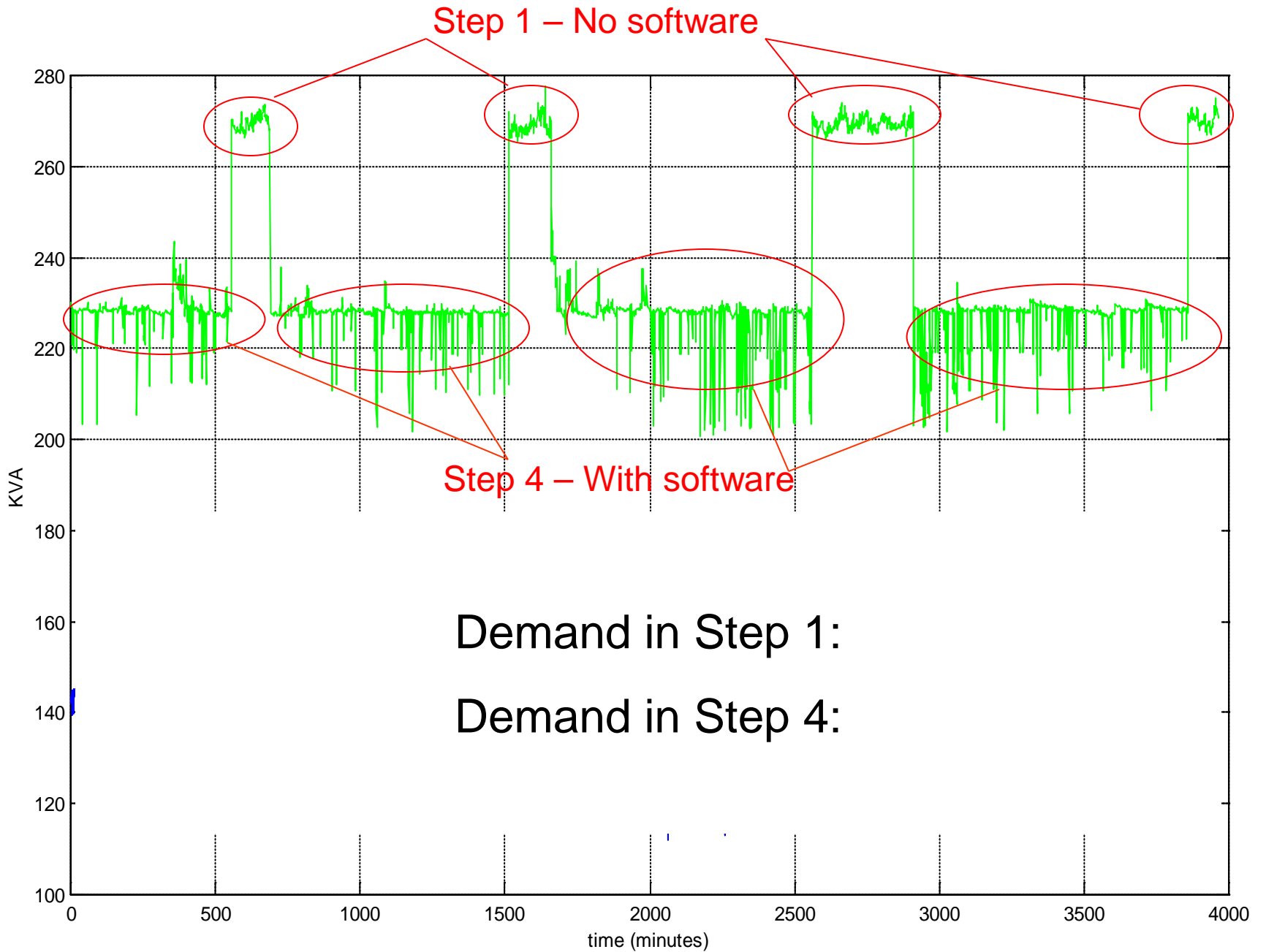
LEVEL

218 FEET

OUTPUT HP **195.9**
INPUT KW **199.1**
OUTPUT KW **146.1**







OPERATIONAL ENERGY EFFICIENCY

Alco Results

MOTOR SIZE 300 hp = 223.8 kW

Efficiency

Loss

- Step I – System with no VFD & Program 39.10% 136.29 kW's
- Step IV – System with VFD & with Program 73.50% 59.22 kW's

Reduction in Loss

77.07 kW's

KWH'S savings per year (Estimated)

540,000 kWh's

Percentage improvement

55.56%

kW Demand Reduction & kWh Energy Savings

- kWh **Estimated Savings** 540,000/year
- kW Demand Reduction was 77.07
- 77.07 kW Reduction = Elimination of 1926
 - Forty-Watt Light Bulbs