

PUMPING EFFICIENCY TESTING SERVICES

*Serving You With
Accuracy And Efficiency*

Introduction

- ▣ Nancy Comstock, President of Pumping Efficiency Testing Services, PETS
- ▣ PETS is a contractor to the PG&E Advanced Pump Efficiency Program, APEP. APEP is administered by CSU Fresno, Foundation, Center for Irrigation Technology, CIT.
- ▣ The Power Utilities Pump Efficiency Programs offer support with your projects that are intended to save energy, reduce demands / loads and improved pumping efficiency.
- ▣ PETS, offers Pump Testing, Energy Cost Savings Analysis, and Incentive Assistance

What I am going to cover today

- ▣ APEP – PG&E's Advanced Pump Efficiency Program – Subsidies the Pump Testing Services and Incentive Assistance
- ▣ Pump Testing and Monitoring, data gathering for your projects, GPM/TDH/KW
- ▣ Pumping Efficiency and Pump Efficiency
- ▣ Why pumps are the focus of the state and power utilities efficiency Programs

PG&E's Advanced Pump Efficiency Program – Benefits

- ▣ You receive subsidized pump efficiency tests and energy cost savings analysis to determine if it is cost effective to rebuild or replace your pumps.
- ▣ Once you obtain that data, should you decide to rebuild or replace your pumps, PG&E has incentives to support your energy savings projects.
- ▣ APEP pays \$.08 or \$.09/kWh saved (depending on the segment municipal or agricultural), up to 50% of the cost of the project.
- ▣ Demand/Load reduction \$100/kW
- ▣ OBF-On Bill Financing, No Interest Loans
- ▣ Incentive Assistance-We act as project managers with respect to your incentive paperwork

Eligibility for Subsidized Pump Tests

- ▣ PG&E's Advanced Pump Efficiency Program provides pump testing for municipal water, agricultural pumping customers, golf courses, tertiary reclamation system, and turf.
- ▣ Pumps that are 25 HP and larger
- ▣ Pumps can be tested under the Program every 23 months
- ▣ On PG&E Customer Service Agreement

Details – Pump Rebuild/Replacement Incentive

- ▣ Program covers pumps, bowls and impellers
- ▣ Can be Pump Replacement or Rebuild
- ▣ Pre- and Post repair pump tests determines savings
- ▣ If system design changes are required:
 - Major design change projects shift to other PG&E Programs:
 - ▣ PG&E Account Executives
 - ▣ Other Third Party Programs
 - ▣ Local Government Partnerships
 - ▣ Savings by Design – New Construction

Pump Testing Services

Why Pump Test ?

PETS - Pump Testing Objective

- ▣ Pump Testing is what we call Maintenance by the Numbers
- ▣ Provide On-Going System of Data to determine pumps that are running inefficiently
- ▣ Routine Process or System of Documentation to justify your budget requests based on the most cost effective pumps to repair or replace
- ▣ This is a great way to track differences in the changes over time. How was this system operating two years ago when we tested last. Compared to today

Why? - Save you time and money and put money back in your clients pockets

- ▣ Give you the data that you need to design your energy saving and demand reduction projects. Saving you time in the field and crunching numbers.
- ▣ Provide you data to reduce clients/customers energy costs and demand charges, and making your project more cost effective.
- ▣ Pump Testing Services: give you the data that you need to improve your systems efficiencies.
- ▣ Energy Cost Savings Analysis to provided basic economic decisions or to integrate into IRR or ROI.
- ▣ Assist you with the Utilities Programs

Why Perform Pump Testing

- ❑ In Complex Society, We have so many demands to perform at levels that were considered out of reach and impractical just 20 years ago. A single person is now being asked accomplish what an entire staff used to do.
- ❑ In the modern model it is imperative to collect accurate and clear data, this is where we have watched the water industry go from a “try it and see how it works” to a highly technical and data driven industry.
- ❑ The “pump Test” has been around since the 1920s and a proven method to look at the Overall Performance Efficiency of your pumping system.
- ❑ As the years have gone on pump testing has been greatly enhanced buy the introduction of the computer age, making it a great tool to look at many different components of the plant (IE. Motor load, Flow testing, Volts, Amps, KW, Power Factor) which in turn gives you the ability to manage your system or your project in a more efficient way.

Efficiency Reports = Energy Cost Savings Analysis and Energy Saving Incentives

- ▣ Pump Test is GPM, TDH and KW – Wire to Water Efficiency Test
- ▣ An Energy Cost Savings Analysis is generated for the efficiency data to provide a basic financial analysis
- ▣ Data is utilized by utility programs to apply for the Utilities On Bill Financing – Zero Interest Loan and Incentive for Energy Savings and Demand Reductions

The Difference between a Pump Test and a Pump Test

- ❑ The difference between a “Pump Test” and an Operational Pumping Efficiency Test
- ❑ Occasionally there is a bit of confusion about the Pump Testing that the Pump Test Companies and utilities provide, and, the standards and new standards for pump manufacturers.
- ❑ Pumps coming off the line from Manufacturers with ratings for their Pump Efficiency, these are called Performance Tests.

OPE - Operational Pumping Efficiency / Overall Plant Efficiency

- ▣ What we provide and the Power Utilities Pump Testing Programs Provide is an Operational Pumping Efficiency or an Overall Plant Efficiency.
- ▣ The Pump and it's Efficiency is just one component of the Operational Pumping Efficiency or Overall Plant Efficiency.

Example:

- ▣ An 85% efficient motor turning a 76% efficient pump, gives you a real efficiency of $0.85 \times 0.76 = 0.65$ or 65% efficient.

Operational Efficiency Tests

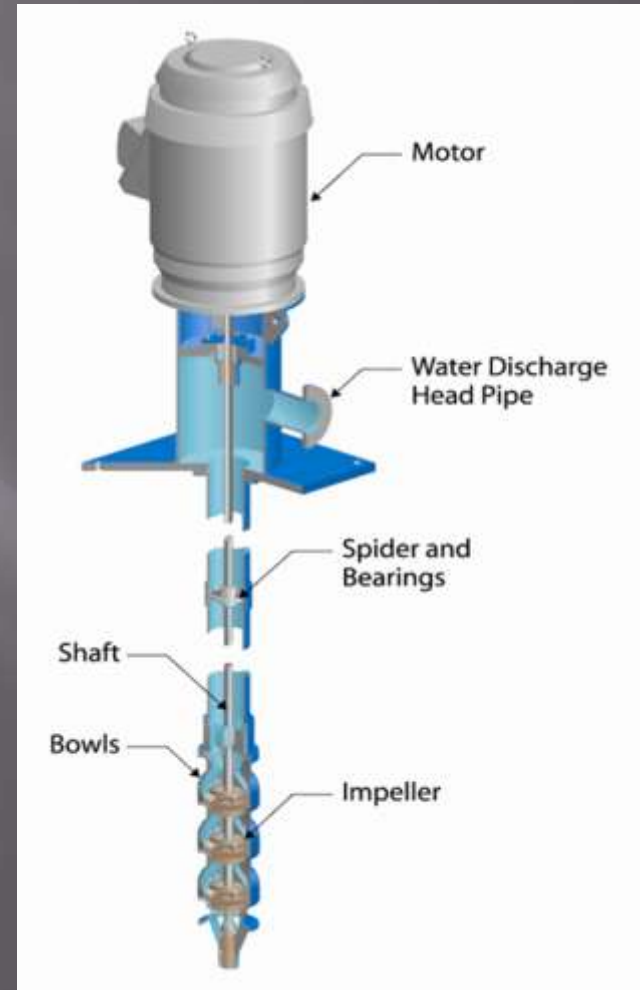
- ▣ The Pump Efficiency Test or “Pump Test” measures your OPE – Overall Pumping Efficiency
- ▣ It is the measure of how your Pumping System is operating
- ▣ OPE tells you how much usable energy you get from the energy you buy (If OPE is 45%, then 55% of energy you paid for is wasted.)

OPE (the number you get from a Pump Test) is a Combination of Efficiencies...

- ▣ Bowl or impeller efficiency (the pump itself) is only one aspect of Overall Plant Efficiency- OPE
- ▣ Must also consider:
- ▣ 2. Transmission efficiency- losses through shafts, bearings, pulleys, v-belts, and delivery system losses, Head losses.
- ▣ 3. Driver efficiency or the efficiency of the power source (motor, engine, etc.)

OPE is a Combination of Efficiencies...

- ▣ Motor Efficiency –
- ▣ 88-95%
- ▣ Transmission Eff. – 95-97%
- ▣ Bowl Eff. – 60s – 80s
- ▣ Thus, $OPE = ME \times TE \times BE$
- ▣ Good OPE:
- ▣ $.67 (67\%) = .93 \times .96 \times .75$
- ▣ Poor OPE:
- ▣ $.46 (46\%) = .93 \times .96 \times .52$



Pumping Systems are Hot Topic

- ▣ Currently the Power Utilities in California are focusing on water pumping systems and pumping systems in general.
- ▣ 1.) Because 20% of the energy in California is consumed pumping water.
- ▣ 2.) 25 - 50 of the energy consumption at plants is consumed by pumping equipment.
- ▣ 3.) The energy savings with pumping systems is excellent because of the Affinity Laws. A 25% efficiency improvement is an approximate 33% energy savings
- ▣ 4.) Water Energy Nexus Focus, Saving Water Saves Energy.

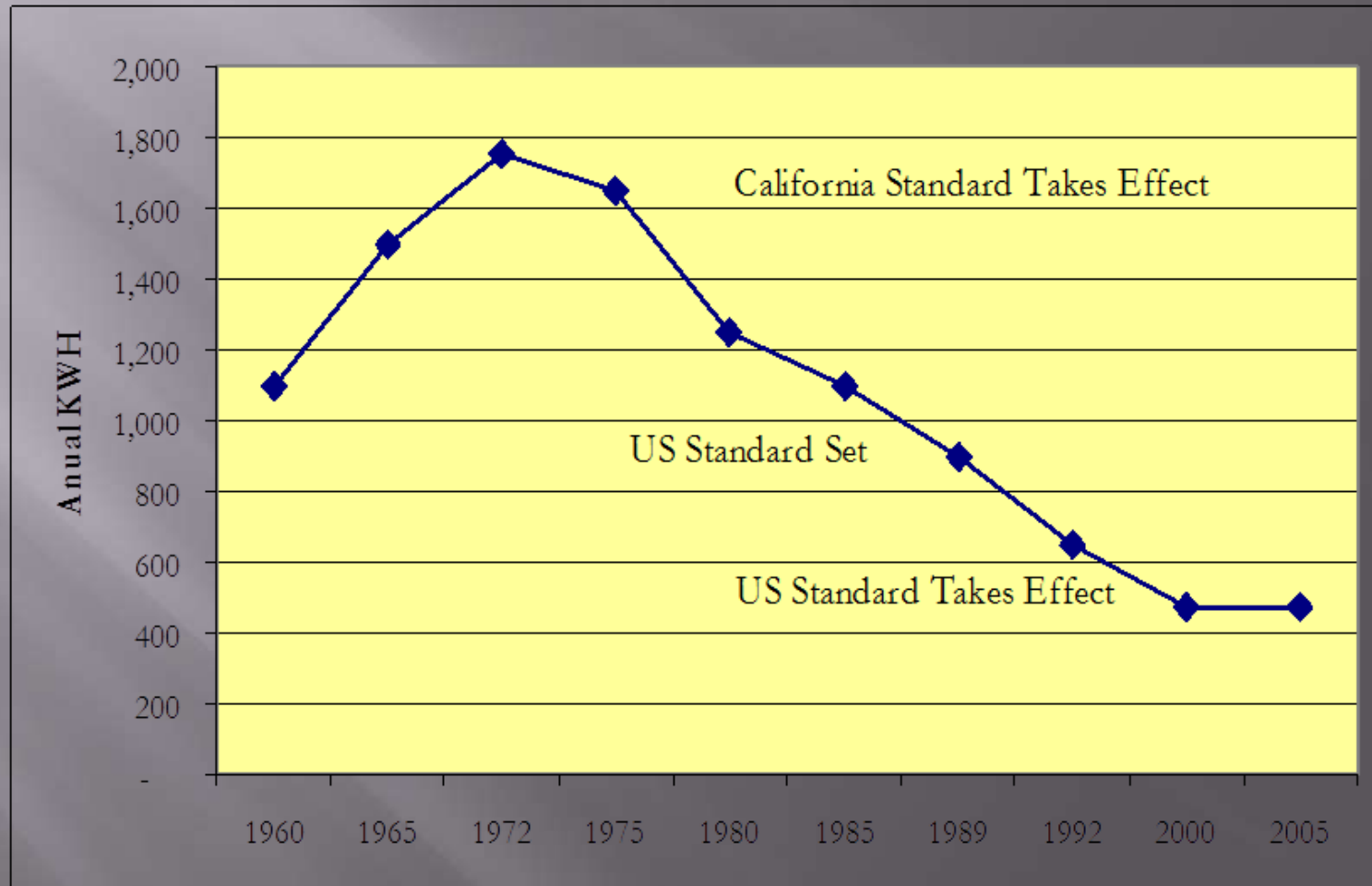
Pump Efficiency

Pump Efficiency not
Operational Pumping
Efficiency

Refrigeration Efficiency Improvements Instrumental...

- ▣ DOE came out with energy efficiency standards for many appliances
- ▣ Refrigerators
- ▣ Central Forced Air Heating Systems
- ▣ Water Heaters
- ▣ Heat Pumps
- ▣ Lighting
- ▣ And More

The Effect of Energy Efficient Refrigeration Standards



Wide Variety of Manufacturer's Pump Efficiencies

- ▣ Many medium and larger centrifugal pumps offer efficiencies of 75 to 93 percent and even the smaller ones usually fall into the 50 to 70 percent range.
- ▣ Large AC motors, on the other hand, approach an efficiency of 97 percent, and any motor – ten horsepower and above – can be designed to break the 90 percent barrier. - See more at:
- ▣ <http://www.pump-zone.com/topics/pumps/centrifugal-pumps/centrifugal-pump-efficiency-what-efficiency#sthash.qNmekhKw.dpuf>

Pump Efficiencies can be just about anything and are...

- ▣ A survey of popular pump brands demonstrates that pump efficiencies range from 15% to 90 %.
- ▣ The question then arises, “Is this very wide range due to poor selection, poor design or some other variable which would interfere with good performance”.

DOE currently studying if they will implement higher Pump Manufacturer Standards for Pumps

- ▣ Currently, at the request of congress, the DOE is looking into setting higher efficiency standards for pump manufacturers.

Conclusion – Huge Bonus Savings with Pumping Systems

- ▣ So to conclude, Whether it is Operational Pumping Efficiency or Manufacturers Pump Efficiency Standards – Pumping Systems hold Huge potential for Energy, Demand and Cost Savings Benefits
- ▣ PG&E and the other Utilities Pump Efficiency Programs have Services, No Interest Loans, Energy Savings and Demand Reductions Incentives to help offset the cost your projects.

Why Pump Test ?

Because it saves you energy
and the associated costs