

B O N N E V I L L E
P O W E R A D M I N I S T R A T I O N

Program Design Options for Variable Speed Drives (VSDs)

Presented by:

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Background on BPA

- Established in 1937 – 72 years young.
- Federal Power Marketing Agency – Department of Energy.
- BPA's service territory covers Washington, Oregon, Idaho, Western Montana, and small parts of Wyoming, Nevada, Utah and California.
- Market and transmit power generated from the Federal Columbia River Power System (FCRPS).
- Approximately 8,000 aMW of energy generated each year.
- Self-financed ~\$3.5 billion/year; US Treasury payments are ~ \$1 billion/year.
- Serve 140 customers (PUDs, Munis, REA Coops, DSIs).
- Deliver our conservation programs via contracts with each of our serving utilities.



VSD Program Options, (just a few..)

- Three possible VSD Program Options:
 - Deemed Savings - VSD Program
Rebates, (\$/hp), Energy savings not measured
 - Evaluated Savings – VSD Program
Incentives, (\$/kWh up to a project cost cap)
Sample of VSD projects are evaluated
 - Measured & Verified (M&V) Savings - VSD Program
Incentives, (\$/kWh up to a project cost cap)
Energy savings, project costs for each VSD project is measured and verified



Deemed Program Option

- BPA does offer **Deemed Incentives** for specific applications:
 - Potato & Onion storage ventilation fan VSD: \$200/HP
 - Turbine pumps <500HP for agricultural irrigation: \$80/HP
 - Dairy milking machines <10HP: \$2200/machine
 - Deemed incentives based on data collected through custom projects
 - Deemed incentives do not apply to projects with mixed measures and interactive effects



Measurement & Verification Program Option

- The BPA approach to VSD projects typically are as **Custom Projects**. The steps to receive an incentive payment (\$):
 - Custom project proposal, which includes M&V plan, is submitted for **each** VSD project. (sample proposal templates available)
 - BPA reviews and declines/accepts the proposal.
 - Proposal must be approved before project can begin. Upon completion of project and M&V...
 - Customer submits a Completion Report with **Verified** savings and **Actual** project costs to BPA.
 - After BPA approval of the Completion Report, customer submits invoice.
 - *Current incentive rate is \$.25/kWh up to 70% cost cap*



Benefits of Measurement & Verification

- “To get detailed, quantitative, and correct information about the system.”
 - Reduce uncertainty, risks for all parties involved that the expected savings and ROI are real.
 - Avoid overly conservative and/or overly optimistic estimates of energy savings.
 - Identify incorrect assumptions, validate computer models.
 - Quantify additional benefits such as O&M, safety, environmental.
 - Establish Key Performance Indicators (KPI’s).
 - Post Commissioning of the energy project.
 - Provides valuable information for the design engineer.



Lessons Learned.....Measuring - "it isn't always easy to do"





(M&V) Provides End User with Valuable Process Data



Photo by: Diagnostic Solutions, LLC



Evaluating Equipment Performance Leads to System Improvements

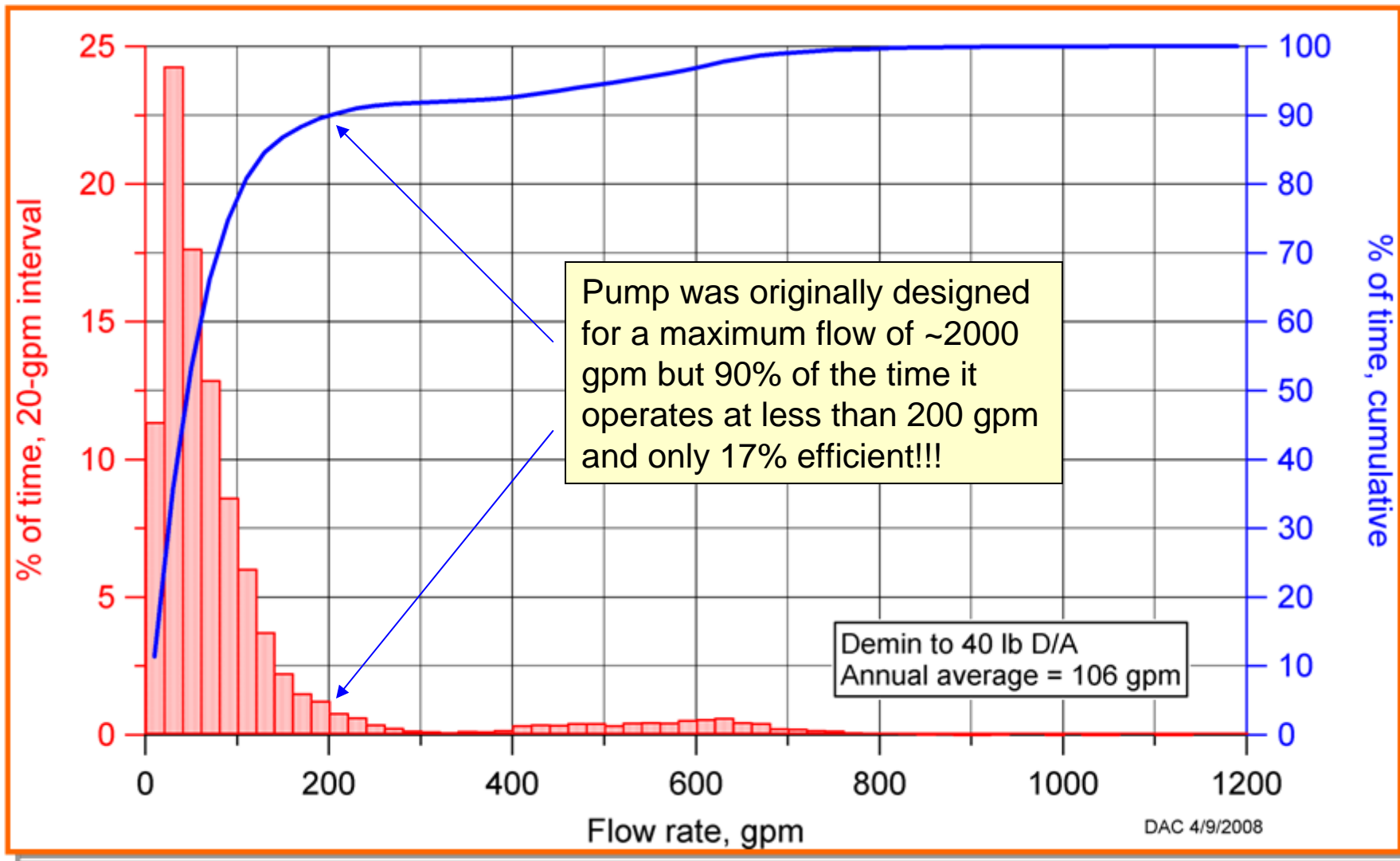


"Metering can be expensive!"



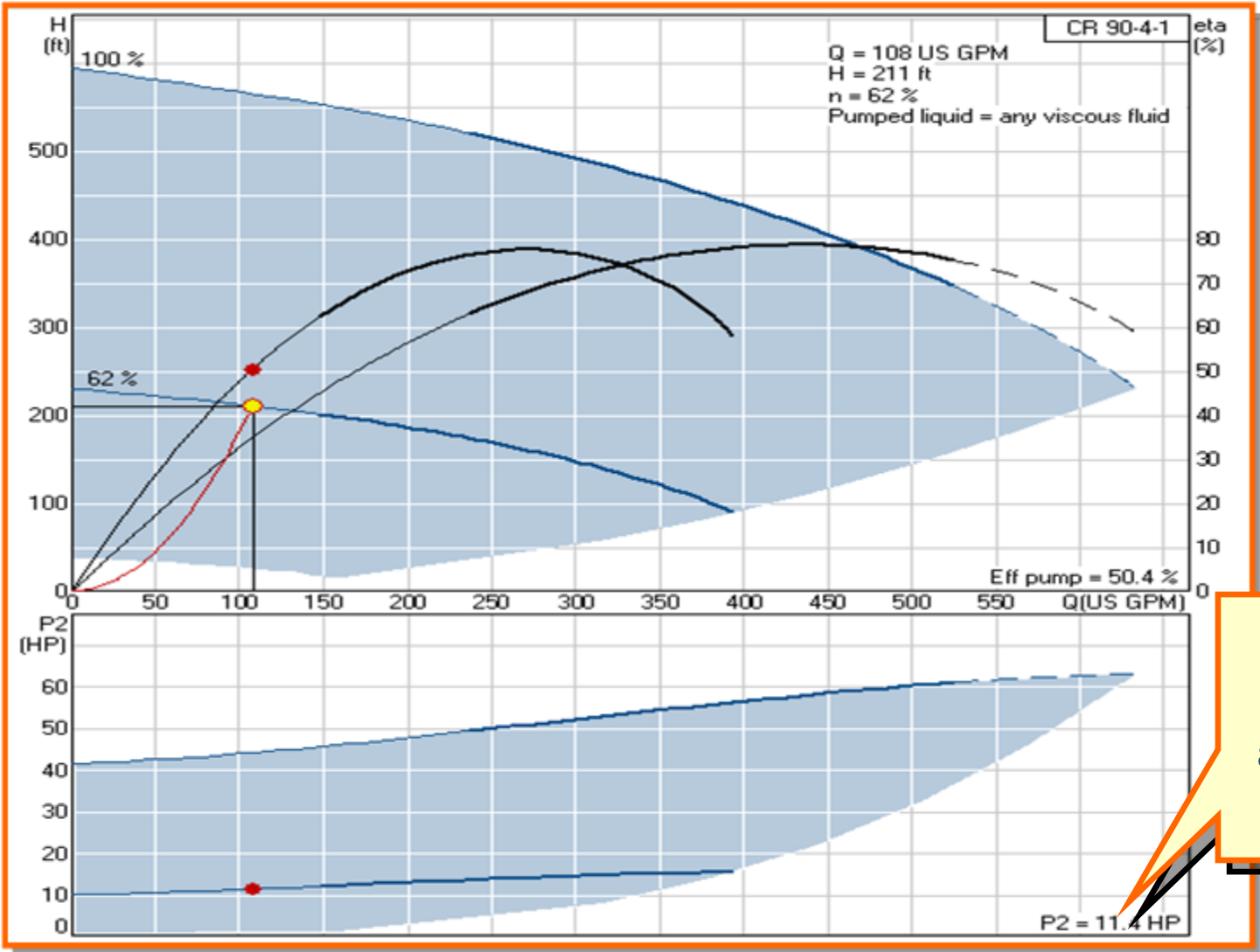


M&V Results.... hourly Average flow rate





At the average flow rate of 108 gpm,
10 hp pump is required, not 100 hp existing.



New Pump and...a VSD!!



In some cases, a New Process may include Used Equipment!





Design the VSD Program to be Flexible



Flow control valve was removed before the baseline was measured...



How can we ensure that the VSD energy savings will *persist*?

- Incorporate Performance Indicators into the M&V plan.
- Assign System Owners.
- Provide system training (CAC, PSAT, FSAT).
- Assign Energy champions.
- Share the M&V results with plant personnel.
- Provide rewards & recognition for their success.



Summary: Benefits, Rules of Thumb

- The significant amount of our Industrial energy savings come from VSD projects
- VSD programs provide an excellent “door opener”
- M&V approach is more labor intensive, can lead to greater energy savings
- ~ VSD costs, \$100/hp
- ~ VSD energy savings per project, 325,000 kWh/yr
- ~ VSD are getting smaller and more advanced



M&V References

- International Performance Measurement & Verification Protocols:
 - <http://www.ipmvp.org/>

- Site Specific Verification Guidelines, BPA 1992:
 - http://www.bpa.gov/Energy/N/Projects/cr_discount/pdf/site_specific_verification.pdf

- FEMP Introduction to M&V for DOE Super ESPC Projects
 - http://www1.eere.energy.gov/femp/financing/superespcs_mvresources.html



BPA References, Tools & Guidebooks

- Additional information on BPA's programs can be found at:
<http://www.bpa.gov/energy/N/projects/index.cfm>
http://www.bpa.gov/corporate/about_BPA/Facts/FactDocs/BPA_Facts_2007.pdf
- Adjustable Speed Drive Energy Savings Calculator
<http://www.bpa.gov/energy/N/projects/industrial/audit/index.cfm>
- Industrial Audit Guidebook
<http://www.bpa.gov/energy/N/projects/industrial/audit/index.cfm>



That's It ...

Thank You!

Questions, Comments...