Irrigation Energy Saving Ideas

Idaho Power

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Existing Systems Modification & New Design Concepts

- Lower the pressure design of the pump.
  - ✓ Low pressure application systems
  - ✓ Pressure zones and multiple pumps
  - ✓ Larger mainlines to reduce friction loss
- Replace pump with one more appropriately designed for the system it is connected to.
- Lower the flow rate design of the pump.
  - ✓ Improve system application efficiency or uniformity.
  - ✓ Change nozzle sizes
- Install a Variable Speed Drive

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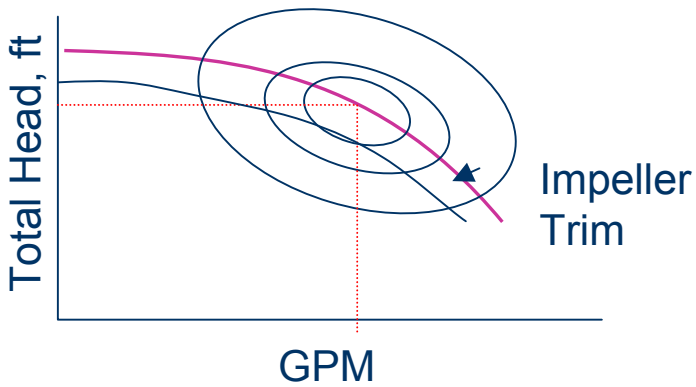
Pressure Design

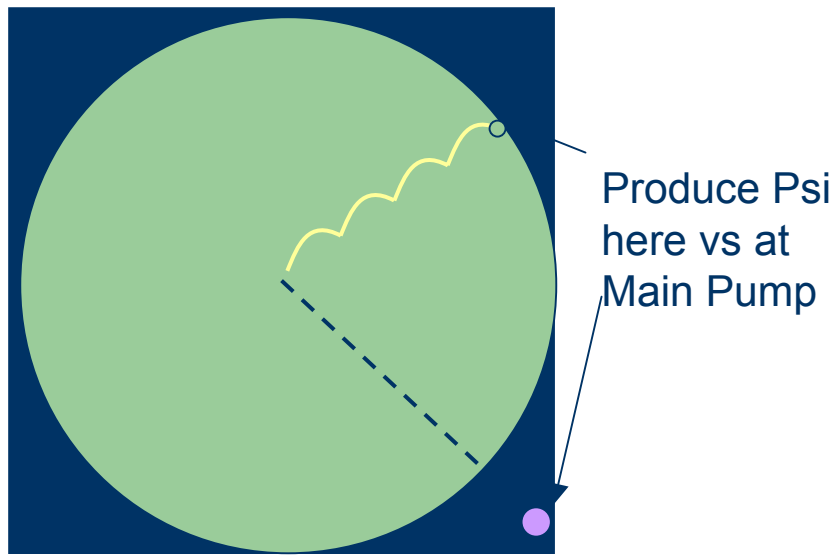
- Convert application system to a lower pressure – trim impeller.
- 20-25 psi is not uncommon
- It is surprising how many pumps are still operating at 75-80 psi supplying pivots designed for 40 psi

Pressure Design

- Specify pump TDH(pressure) for low-pressure pivot rather than the corners, Trim impeller. Use low-pressure diffuser nozzles in corner handlines.(Easier to do if corners are Solid Set with 40x40 spacing)
- Use an end gun booster pump, for low-pressure pivots rather than designing the main pump to produce enough pressure for the end gun.

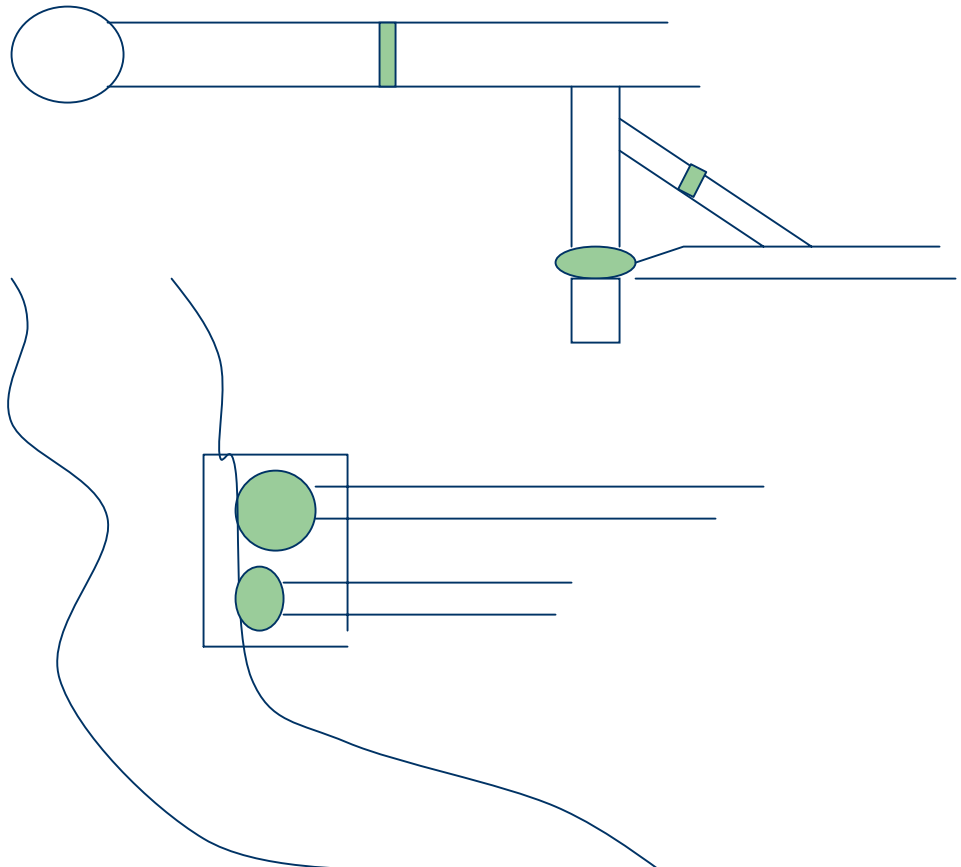
20 PSI reduction @ 1150 GPM =
- 16 BHP savings or 13.5 kW
- 27,000 kWh/yr
- $1075 per year @ .04 $/kWh





Supply Pressure in Zones

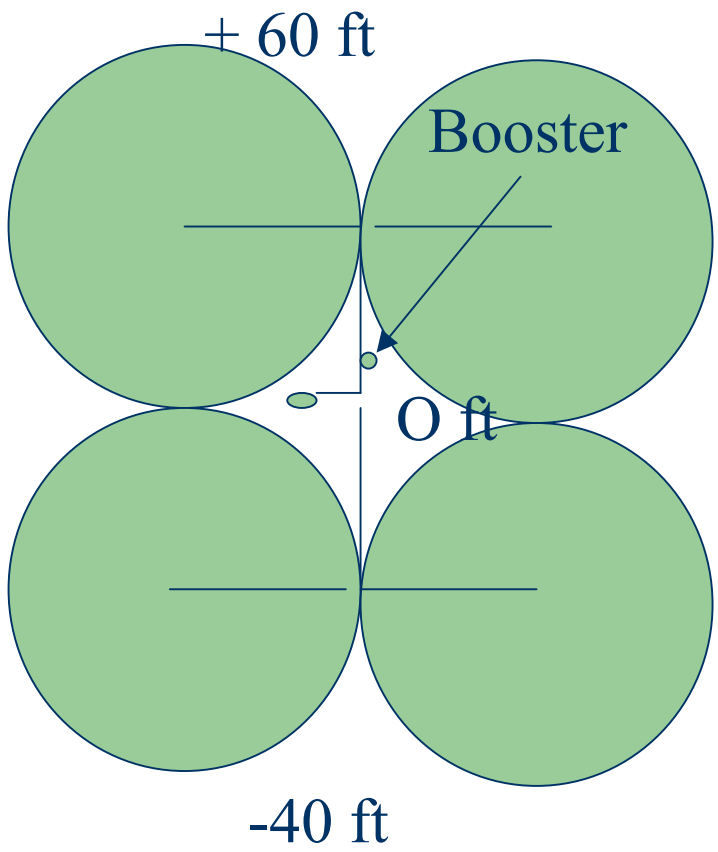
- Use multiple pumps to produce pressure for high pressure areas
- Handlines here can be off separate pump if the mainline can be separated
- Savings can be substantial depending on the amount of flow not pressurizing.



Supply Pressure in Zones

Use multiple pumps to produce different pressures for different elevations

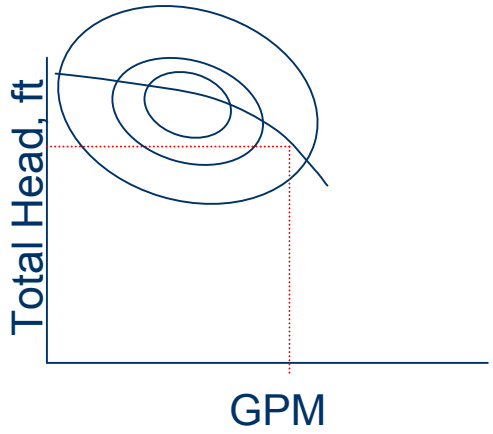
26 PSI reduction @ 1800 GPM =
- 40 BHP savings or 32 kW
- 64,000 kWh/yr
- $2560 per year @ .04 $/kWh

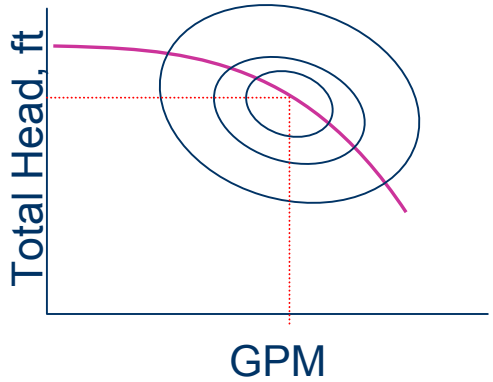


Proper Pump Efficiency

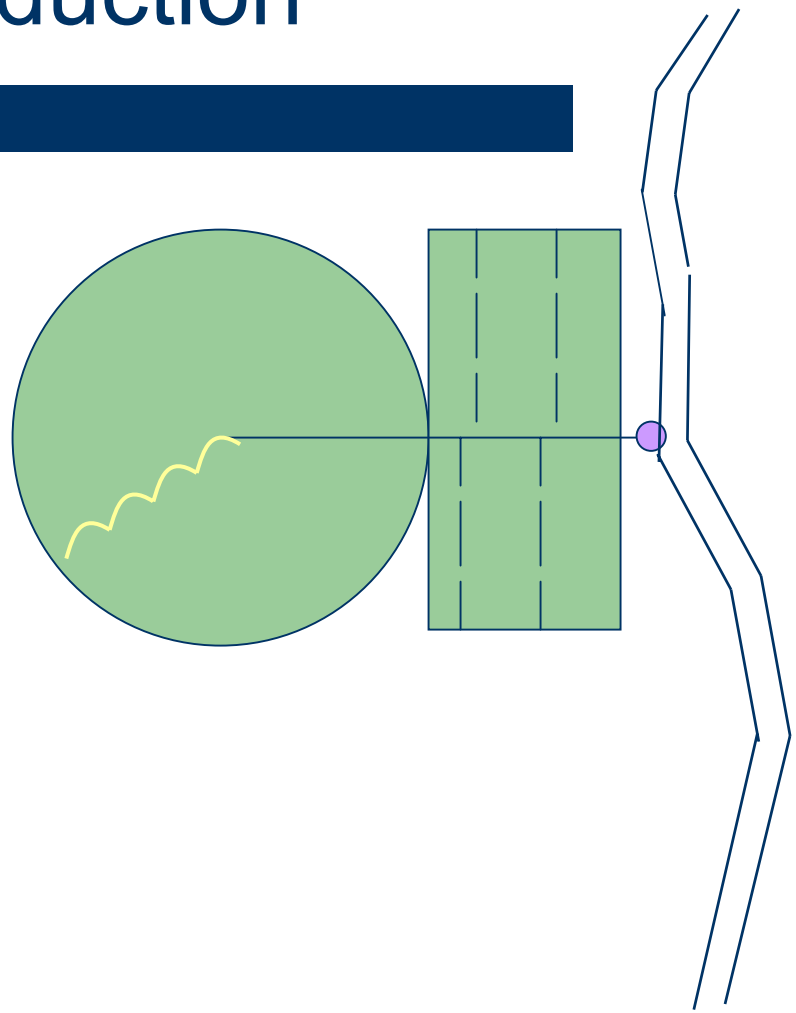
- Avoid operating outside of best efficiency point. Avoid multiple flow conditions by planting same crop over entire system.
- Just because a pump will do the job doesn't mean it is doing it efficiently

10% increase @ 1150 GPM =
- 6.5 BHP savings or 5.4 kW
- 10,800 kWh
- $432 per year @ .04 $/kWh



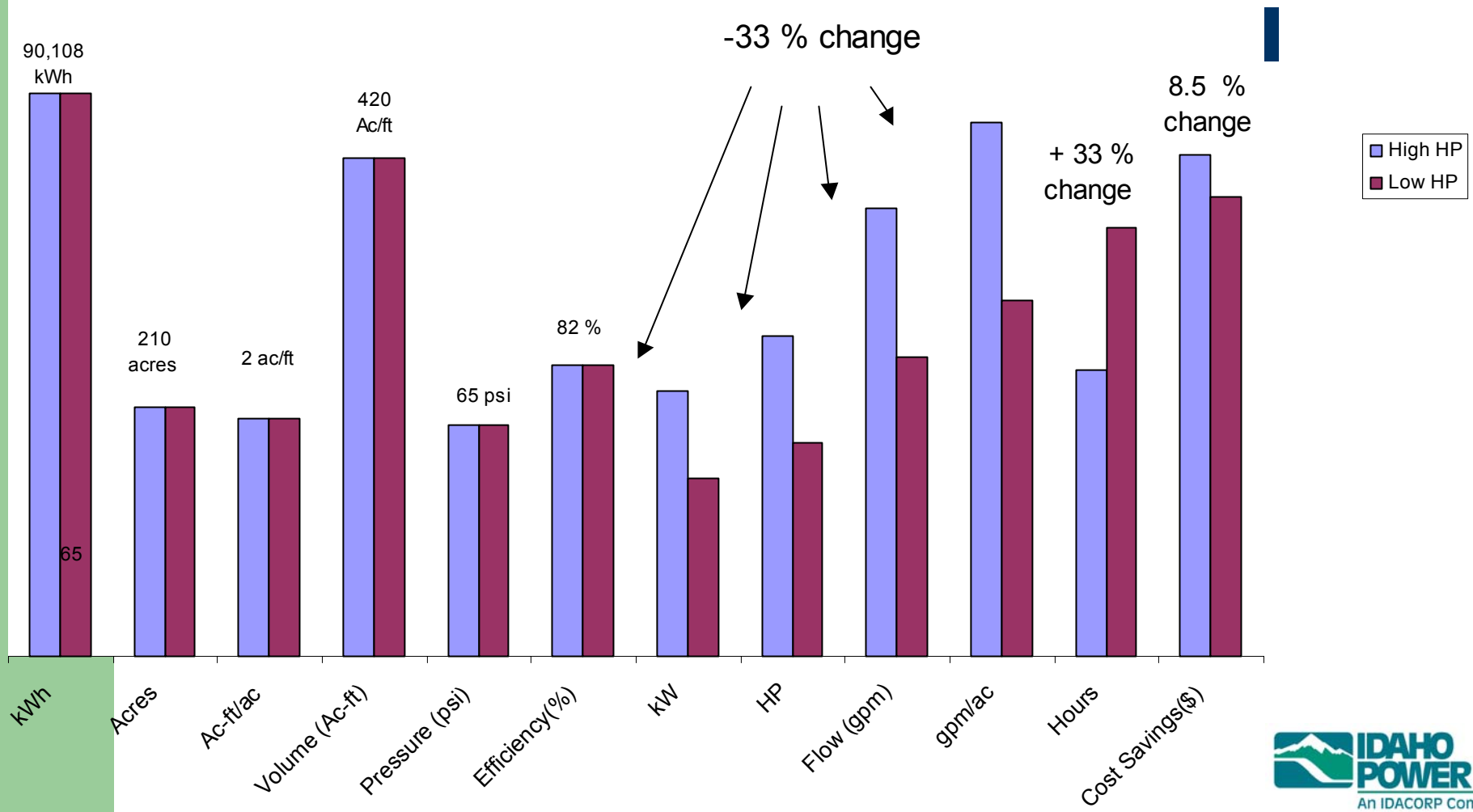


Flow Reduction



•33 % change in flow with volume remaining the same
=
• 8.5% reduction in Power Bill
•Assuming current Demand Charge @ $3.58

Flow Reduction-Cont.



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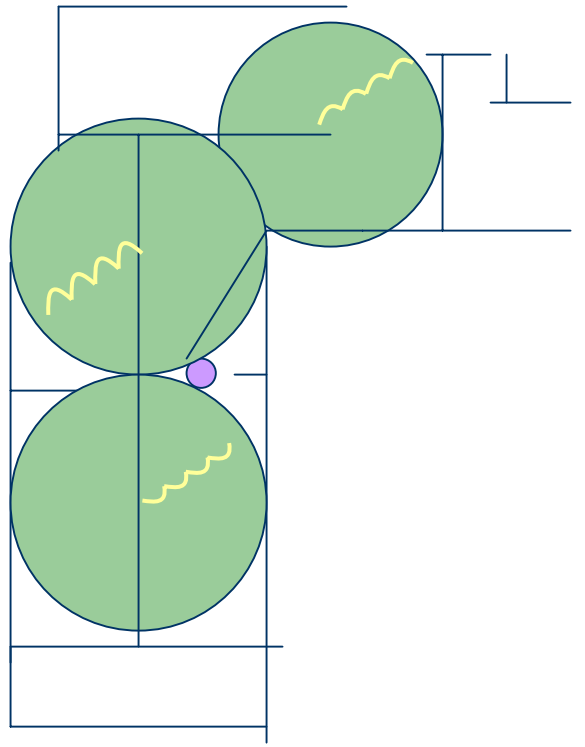
Variable Speed Drives

- Normally no Demand Savings
- Energy Savings Calculations are not hard, but they do require the Pump Curve and some knowledge of the specific System
- Design head is usually constant (although multiple set points are advantageous)
- Pump efficiency **does not** stay constant
- Cost per Hp seems to range between $90 and $200.

Variable Speed Drives

- *450 Hp Well*
- *490 acres*
- *3 Pivots, 2@130 ac, 1@100 ac,*
- *150 ac of handlines and wheelines including some corners*
- *Saves 9.5 % per year*
- *8 year payback*



Summary

- All of these ideas can lower your energy bill and improve the bottom line
- Pressure is equal to flow in its impact on total Hp of a system.
- Ideally the system would only produce the amount of flow and pressure that is needed at each nozzle.