



# Progression of a Public Water Utility to a More Sustainable Future

Mountain Regional Water S.S.D. – Park City, UT

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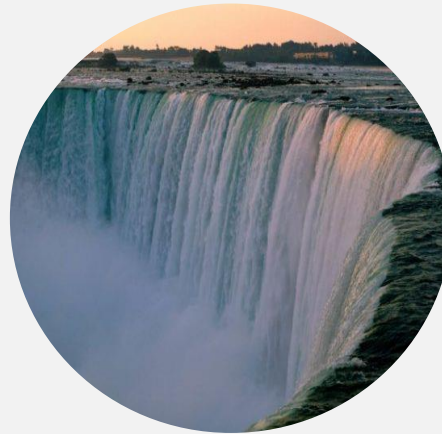


**WE ARE FACED WITH ALMOST CERTAIN  
CHANGE AS A WATER COMMUNITY IN  
THE INTERMOUNTAIN WEST.**

**THE ABILITY TO ENDURE WILL BE  
PREDICATED ON OUR ABILITY TO  
ADAPT.**



# SUSTAINABILITY (ECOLOGY): THE CAPACITY TO ENDURE



# CONSERVATION & OPTIMIZATION OF SOURCES

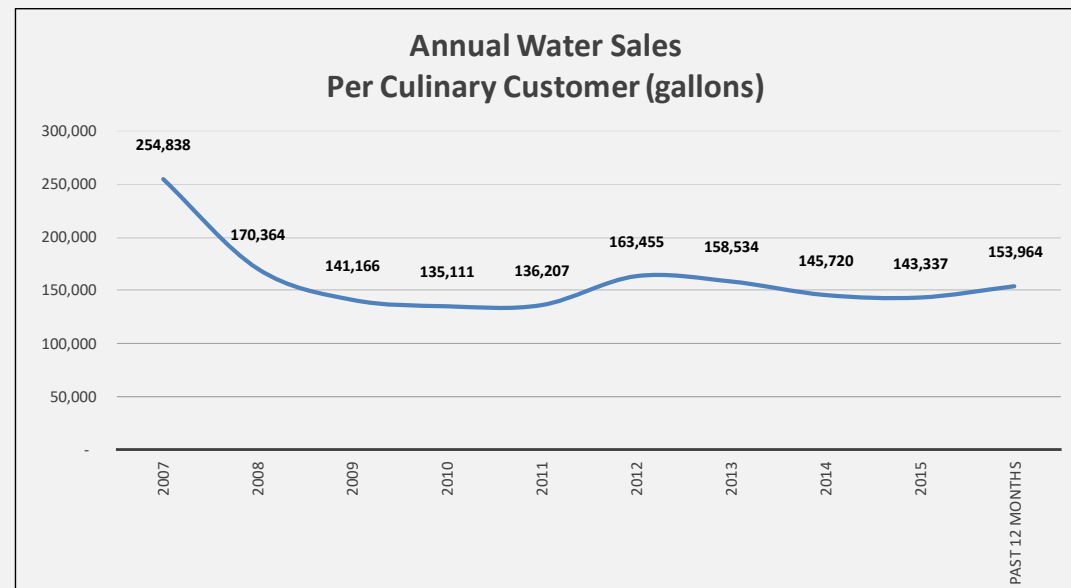
## Included Topics

- Conservation Rates
- Minimizing Losses
- Targeted Flushing
- Source optimization



# Conservation Rate Schedules, Fees and the Future

- Conservation rate schedules have significant impact on usage
- Other fees: altitude, energy projects
- What will the future bring?
  - Peak demand modulation – incentives
  - Peak demand charges (ex. power rates)

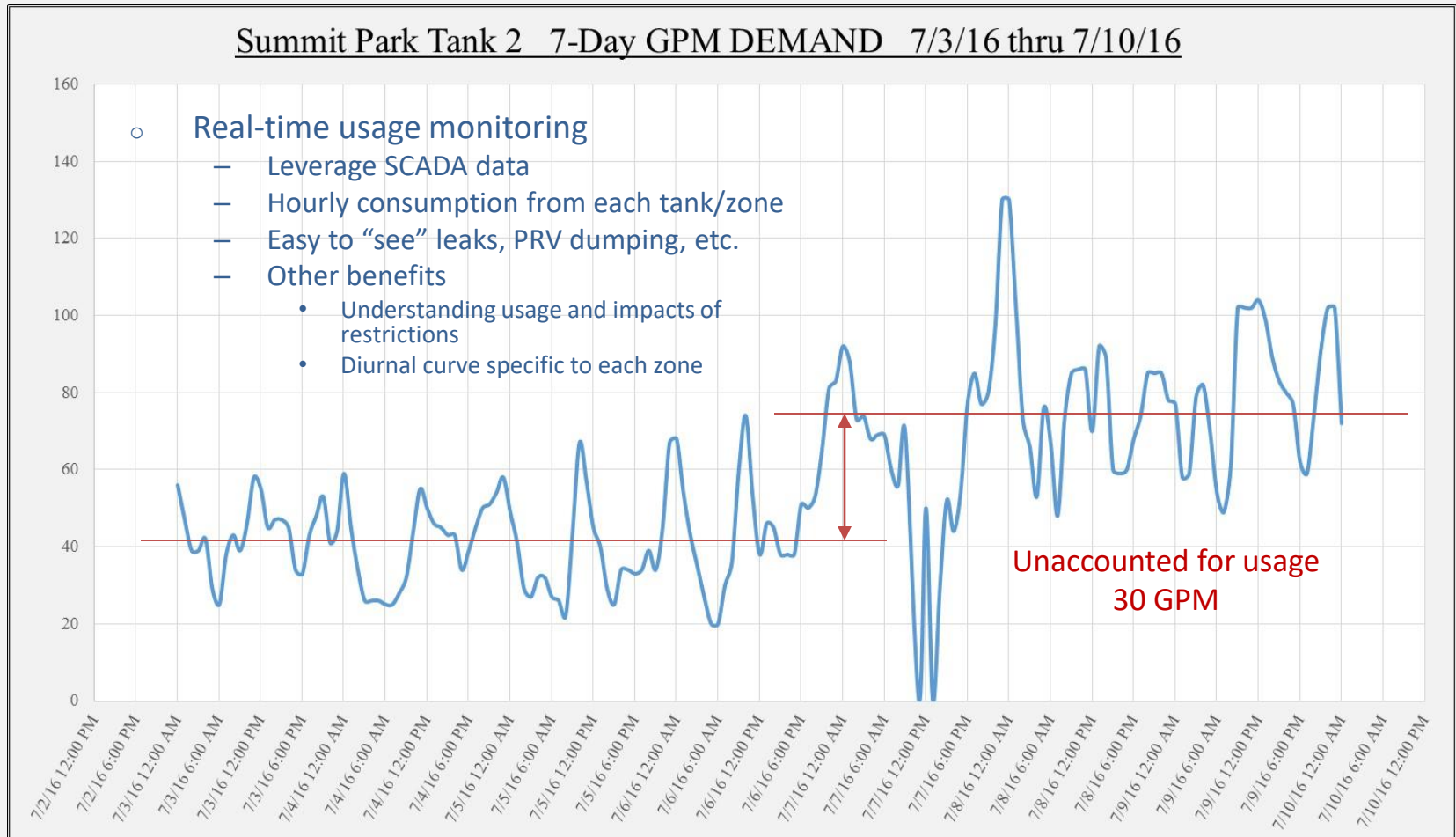


# Reduce Your Water Losses

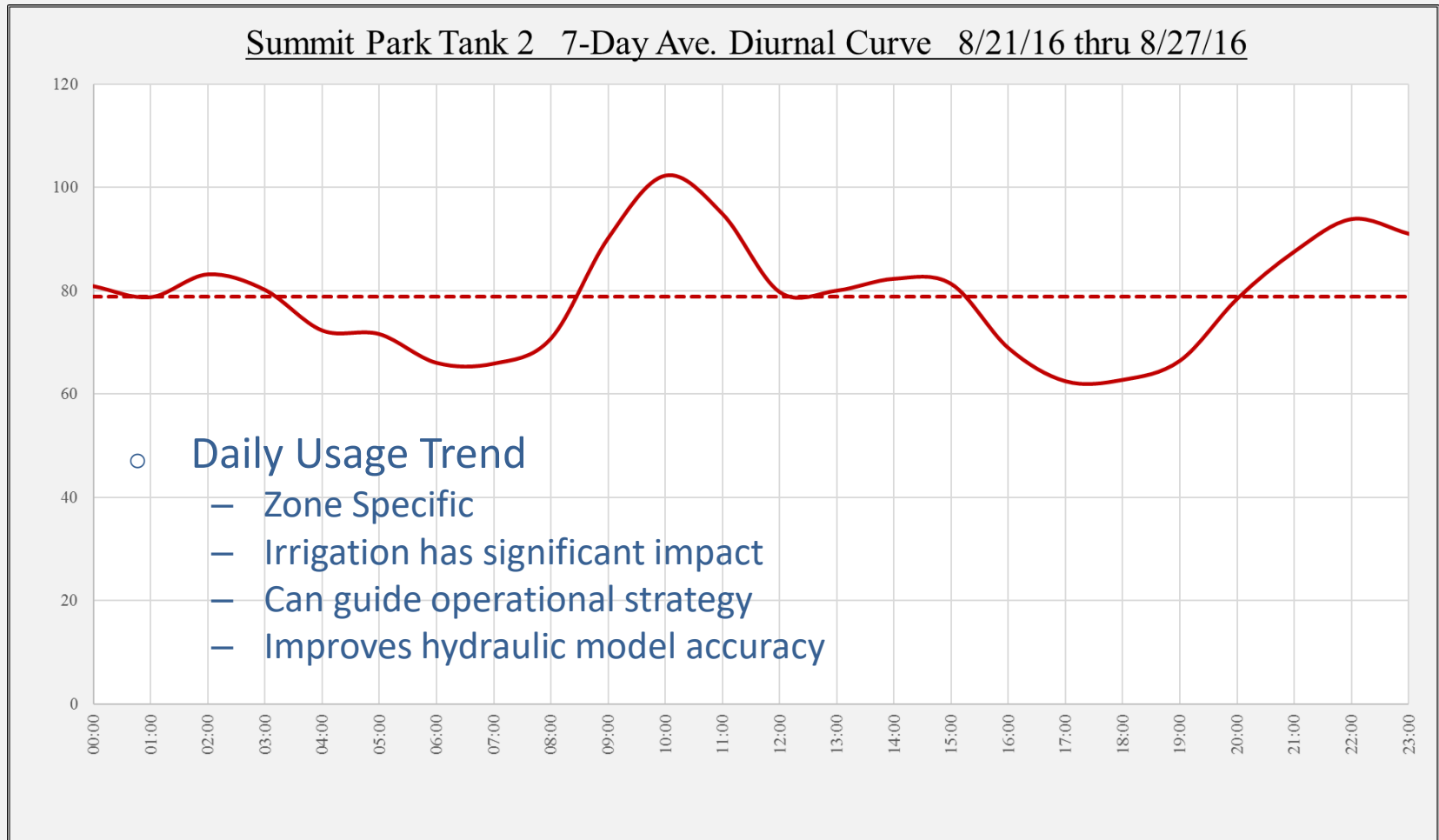
- Leak Week
  - Choose a low demand time of year
  - Set your system to go “quiet”
    - Top off your tanks
    - Shut down sources and pump stations
- Results:
  - Usage per customer delineated by zones
  - Spatial representation of water losses
    - Action areas
- Incorporating Meter Reads
  - Compare master meter supply to tank usage – transmission line losses
  - Real-time, high resolution customer meters can provide accurate water loss data between tank and point of use
    - Complete a meter read at the beginning of the test
    - Complete second meter read at completion of test
    - Compare usage out of tanks to meter usage



# Reduce Your Water Losses – Improving Data Visualization



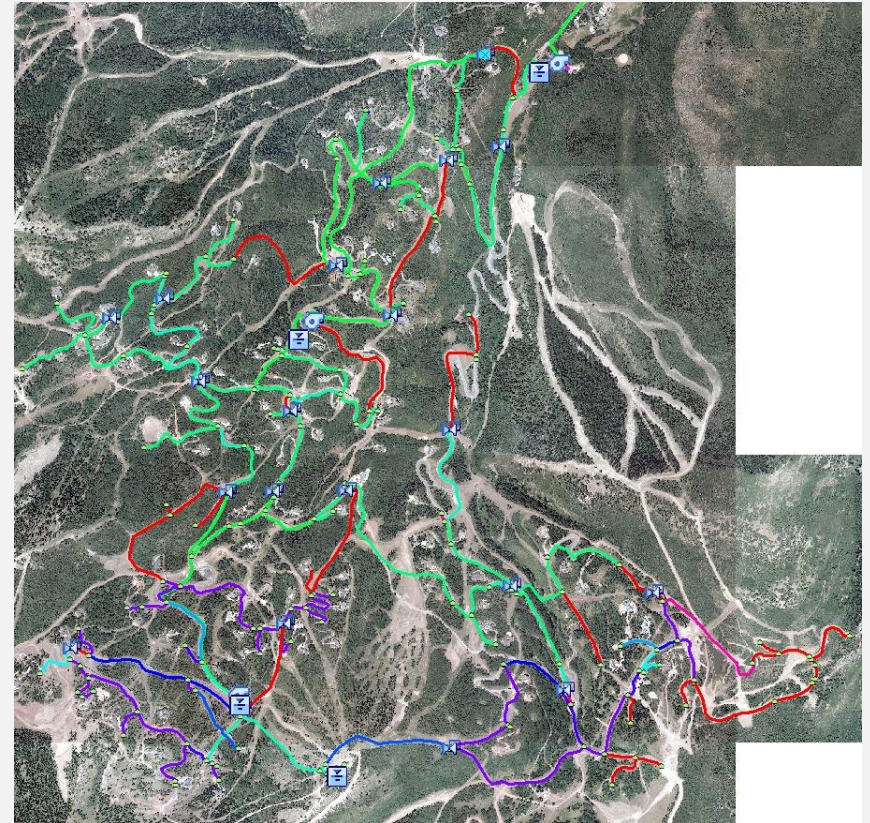
# The Diurnal Curve





# Add Sophistication to Your Flushing Program

- Perform water quality analysis using hydraulic model
- Flow paths may not be what you thought
  - Especially with parallel PRVs
- Prioritize flushing needs
  - Flush high priority areas more regularly
  - Don't flush what you don't need to
- Provide flush times to field personnel
  - Use pitot gauges in the field



Hydraulic Model Representation: water quality simulation



# Optimize Your Sources – Treatment Facilities

- New tube settler added to sludge clarifier – destination for filter backwash water
- Lengthened residence time improves decant water quality
- Improved water efficiency - decant water can now be sent to the head of the plant
- Other benefits
  - Improved solids handling
  - Decreased maintenance to remove solids from irrigation wet well



# Optimize Your Sources - Wells

- Upsize well capacity where applicable
  - Take advantage of a maintenance event to upsize
  - Does it lead to a “cheap” source?
  - Review your well inventory for upsize opportunities
    - May require drilling a second (redundant) well
      - Attractive for critical sources



# INFRASTRUCTURE: THE 3 Rs

Robust, Redundant --> Resilient

## Included Topics

- System Robustness
- Redundancy in Storage & Sources
- Redundancy in Booster Station Design





# How Healthy (Robust) is Your System?

- System robustness is related to facility condition
- Preventative maintenance/monitoring program
  - Routine facility inspection/cleaning
    - Leak detection, pump wear (sound)
    - Infrared imagery on electrical connections
    - Compare actual pump performance curve & efficiency curve against theoretical
  - Distribution system; PRVs, hydrants, valves



# Add Redundancy in Storage and Sources

- Stacked zones offer storage flexibility and redundancy
  - Middle Valley Tank – 1MG
    - Back feed to treatment plant
    - Drop into a lower zone
      - May offer net positive energy generation: fill tank off-peak, drop water through turbine on-peak
- Bison Bluffs Well
  - 1,500 GPM source drilled next to critical source



# Add Redundancy in Pump Station Design

- 1 Pump versus many – the tradeoffs in designing for peak day at buildout capacity
  - Large pumps were the historical approach
  - Demands now versus later
  - Benefits of many smaller pumps
    - Decreased risk of critical shutdown
    - Spare pump/motor likely cheaper and feasible
    - Scalable with growth and demand
    - Energy consumption benefits



# REDUCE YOUR OPERATING COSTS

## Included Topics

- Power and Energy Costs
  - Source Prioritization
  - Appropriate Rate Selection
  - Jockey Pumps
  - Pump Operating Point
  - Heating & Cooling Loads
- Surge Tank Charging
- In-House Maintenance



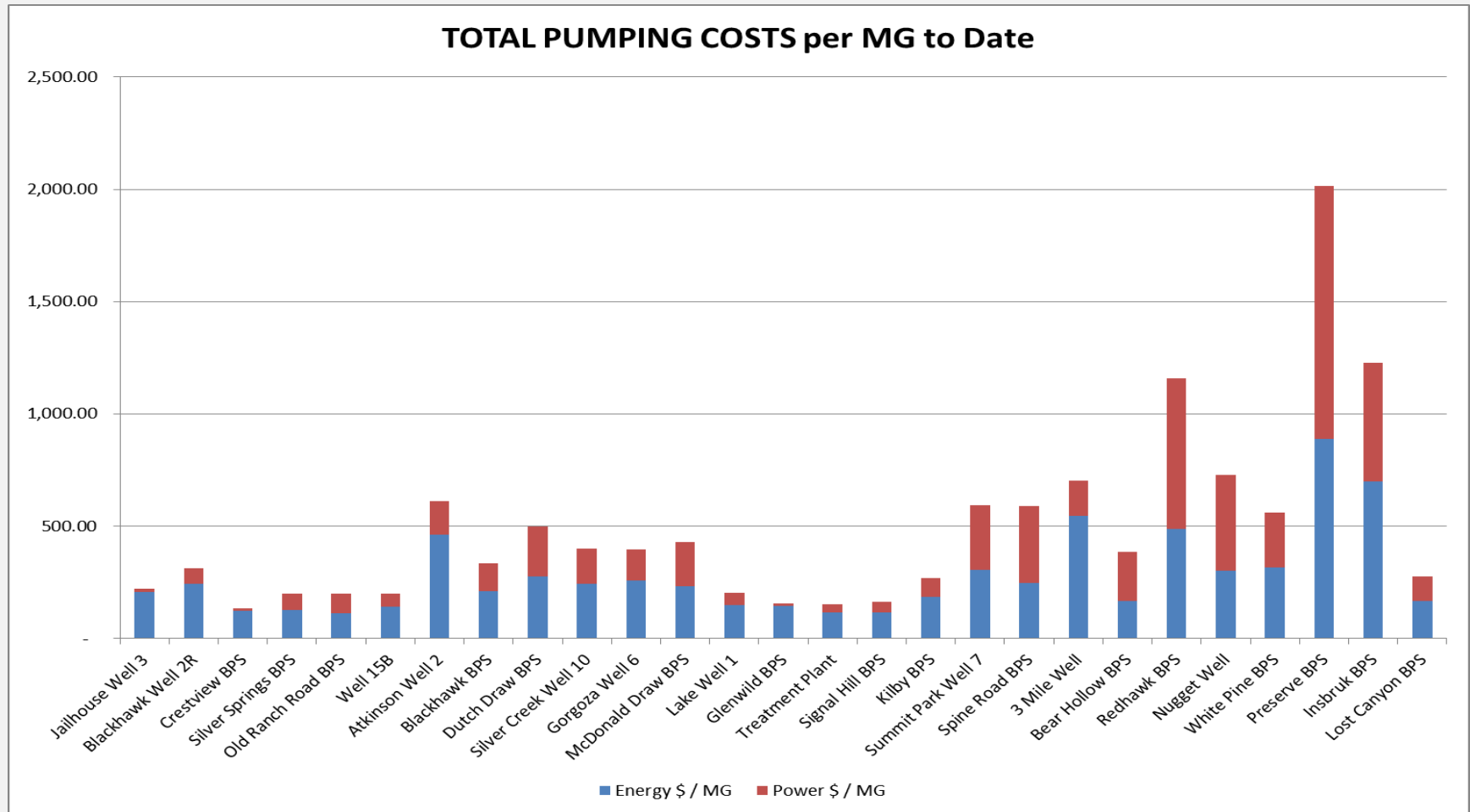


# Power and Energy – What's the Difference

- Power: the peak or set output capacity of a mechanical device - such as an electric motor on a pump
- Measured in hp
- Similar to flow in a water system; measured at one instance
- Energy: measurement of the amount of power consumed over a period of time; Power x Time
- Measured in kwh
- Similar to volume in a water system; measured over time



# Reducing Energy Costs - Prioritize Your Sources



# Reducing Energy Costs – Select the Appropriate Rate Structures

- RMP Rate Structures
  - Rate 23: small facility rate
  - Rate 6: most common pumping rate; great for high load factor facility (jockey pump)
    - High cost power, low cost energy
  - Rate 6A: great for low load factor facility that can run off-peak
    - Low cost power, high energy charge if on peak
    - Remember, tanks are your battery
  - Rates 8 & 9: large facility rates
- Prioritizing low cost sources and selecting the appropriate rate structure are the low hanging fruit to energy savings!



P.S.C.U. No. 49

First Revision of Sheet No. 6.1  
Canceling Original Sheet No. 6.1

ROCKY MOUNTAIN POWER

ELECTRIC SERVICE SCHEDULE NO. 6

STATE OF UTAH

General Service - Distribution Voltage

**AVAILABILITY:** At any point on the Company's interconnected system where there are facilities of adequate capacity.

**APPLICATION:** This Schedule is for alternating current, single or three-phase electric service supplied at Company's available voltage, but less than 46,000 volts through a single point of delivery, for all service required on the Customer's premises. This Schedule is for nonresidential Customers whose loads have not registered 1,000 kW or more, more than once in the preceding 18-month period and who are not otherwise subject to service on Schedule 8. This Schedule is for general nonresidential service except for multi-unit residential complexes master metered in accordance with the Utah Administrative Code, Section R746-210. Service under this Schedule is also available for common areas associated with residential complexes.

**MONTHLY BILL:**

**Customer Service Charge:**

\$54.00 per Customer

**Power Charge:**

**Billing Months - May through September inclusive**  
\$18.12 per kW

**Billing Months - October through April inclusive**  
\$14.54 per kW

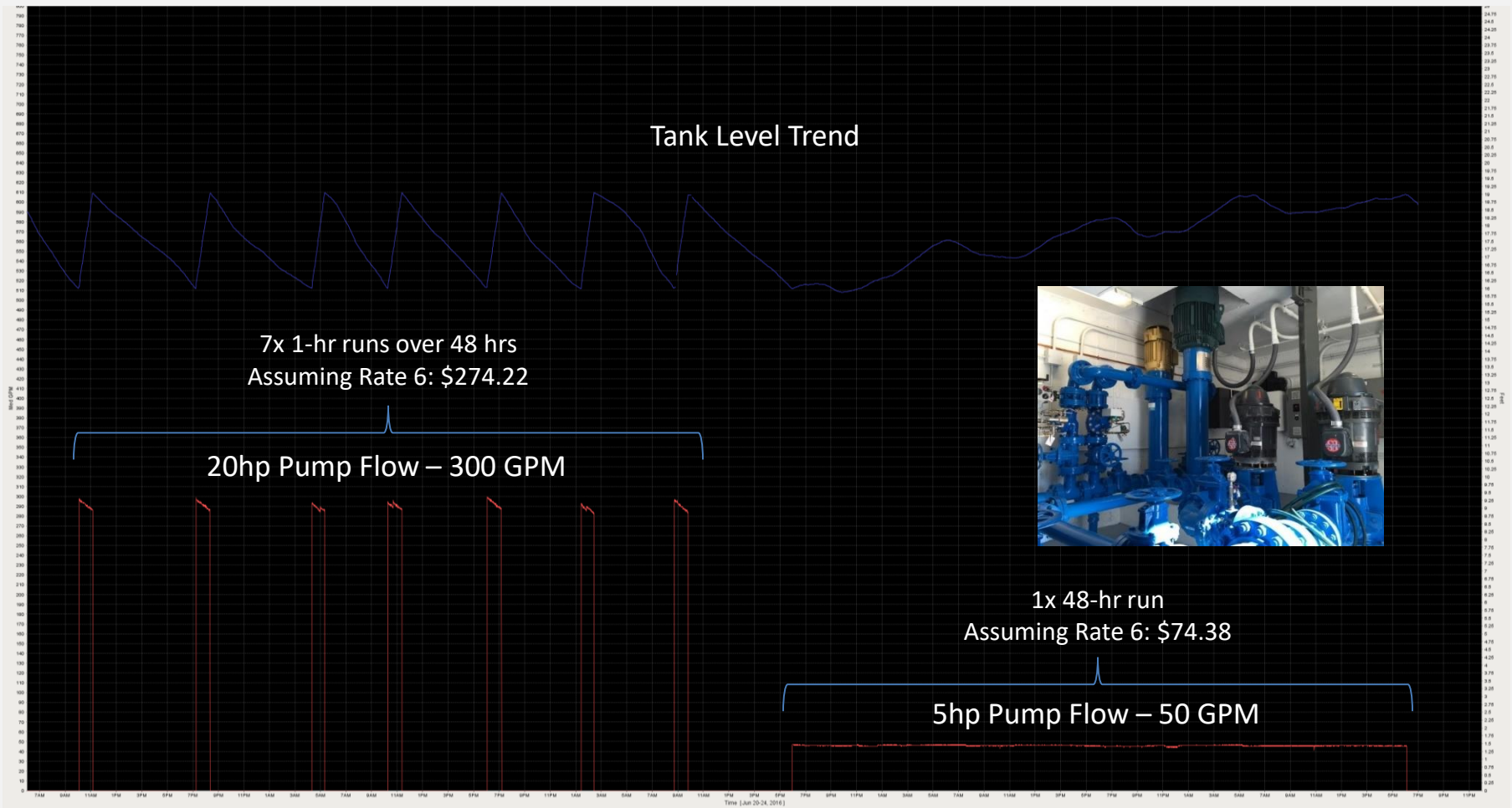
**Energy Charge:**

**Billing Months - May through September inclusive**  
3.8127¢ per kWh for all kWh

**Billing Months - October through April inclusive**  
3.5143¢ per kWh for all kWh



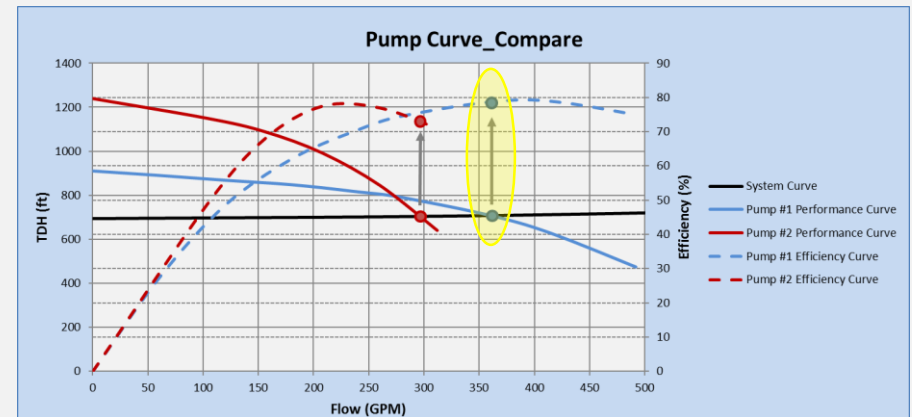
# Reducing Energy Costs – Install Jockey Pumps



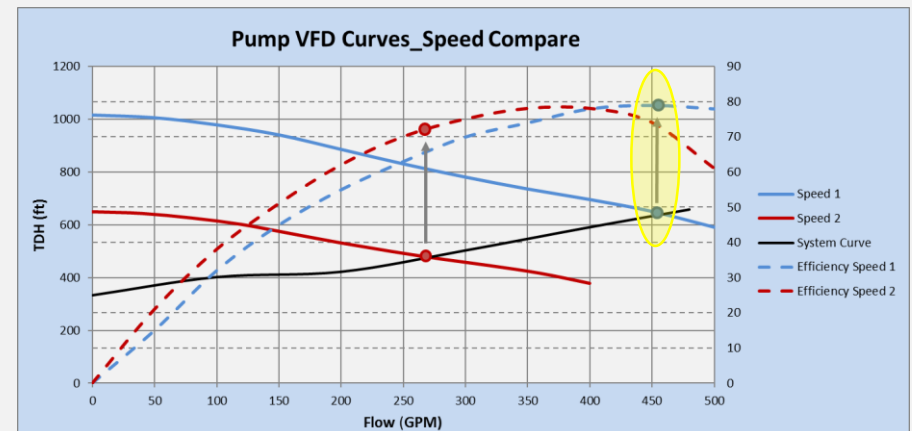


# Pump Stations: Pump Selection, Operating Points

- Pump Selection
  - Always plot a vendor's suggested pump against your system curve to determine operating point(s)
    - How close to BEP?
  - Pump replacement is a good opportunity to revisit options
    - Don't just replace what you have with the same, reassess.



- VFD Operating Point
  - New pumps, understand operating range and compare efficiencies at various speeds
    - Must overcome static head
  - Existing pumps, construct your own pump and efficiency curves at various speeds and select the most efficient point possible



# Understand your Heating/Cooling Loads

- Heating and cooling loads can be a significant portion of your power bill
  - >20%
- Water systems offer geothermal heating/cooling opportunity
  - Closed loop heat exchanger – NSF approved
  - The water effectively lowers the work required of the heating/cooling unit



Geothermal cooling system



# Liquid Nitrogen and Surge Tanks

- High pressure, oil free air compressors can be costly to purchase & maintain
- Vaporizing liquid nitrogen is a great way to push down surge tank water level
- Benefits:
  - Operating costs ~10%
  - No noise
  - Works much faster
  - Lower solubility in water
  - Decreased tank corrosion



Liquid nitrogen system



# Perform Maintenance In-House

- Activities MRW addresses internally:
  - Pump extraction/installation
  - Plumbing reroutes, appurtenance replacement & maintenance
  - Preventative maintenance; PRVs, hydrants
  - Facility upgrades
- Benefits
  - Reduces down time
  - Increases service life
  - Reduces operating costs
  - Expansion of knowledge, improved sense of pride and ownership





# STAFFING



# Tenure Generates Stability and Agility

- The water provider's mission statement: provide safe and reliable drinking water to our customers
  - The reliability/stability of your system is only as stable as your staff
- Emergency Response
  - Agility requires quick thinking and system knowledge
- Continuous improvement pushes us toward a more sustainable future
- Continuous improvement requires an invested, knowledgeable staff
- People are the foundation of our organizations
  - How do you keep your employees happy and motivated?
  - You get what you pay for



# Summary

- Water resources
  - Get more out of what you have – won't always be able to build out of a constraint
- Infrastructure
  - A robust infrastructure is one you can trust when the system is stressed
- Financial
  - Improve financial stability through rate structure augmentations and lowering operating costs



**PROGRESSION STARTS WITH A LEADER  
AND GROWS INTO CULTURE. TAKE A  
STEP BACK, THINK, AND DON'T BE  
AFRAID TO MAKE MISTAKES!**





**QUESTIONS?**

