Using Data Analytics and OSIsoft's Connected Services to Remotely Monitor and Optimize Energy Usage

Presented by **Jeff Neemann**

BLACK & VEATCH
Building a world of difference.

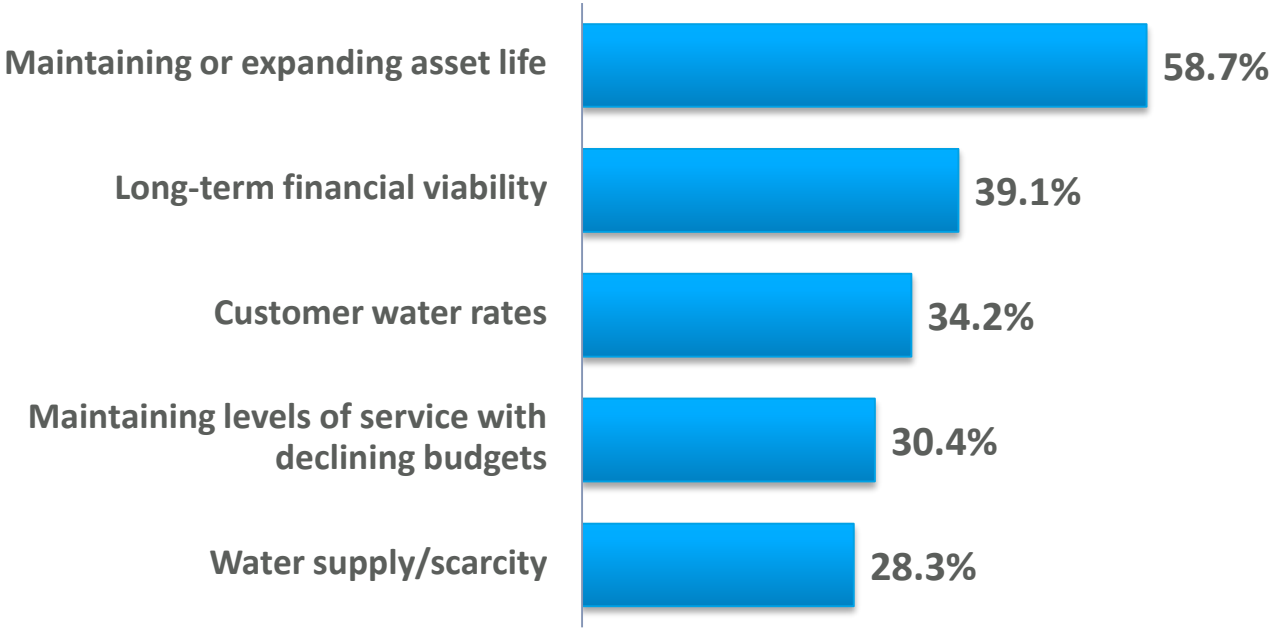
WE'RE BUILDING A WORLD OF DIFFERENCE. TOGETHER.

- Founded in 1915
- Global workforce of more than 10,000
- Employee-owned corporation
- $3.0 billion in annual revenues in 2014
- More than 110 offices worldwide
- Completed projects in more than 100 countries

Black & Veatch conducts 7,000+ active projects globally at any one time

WHY ANALYTICS?

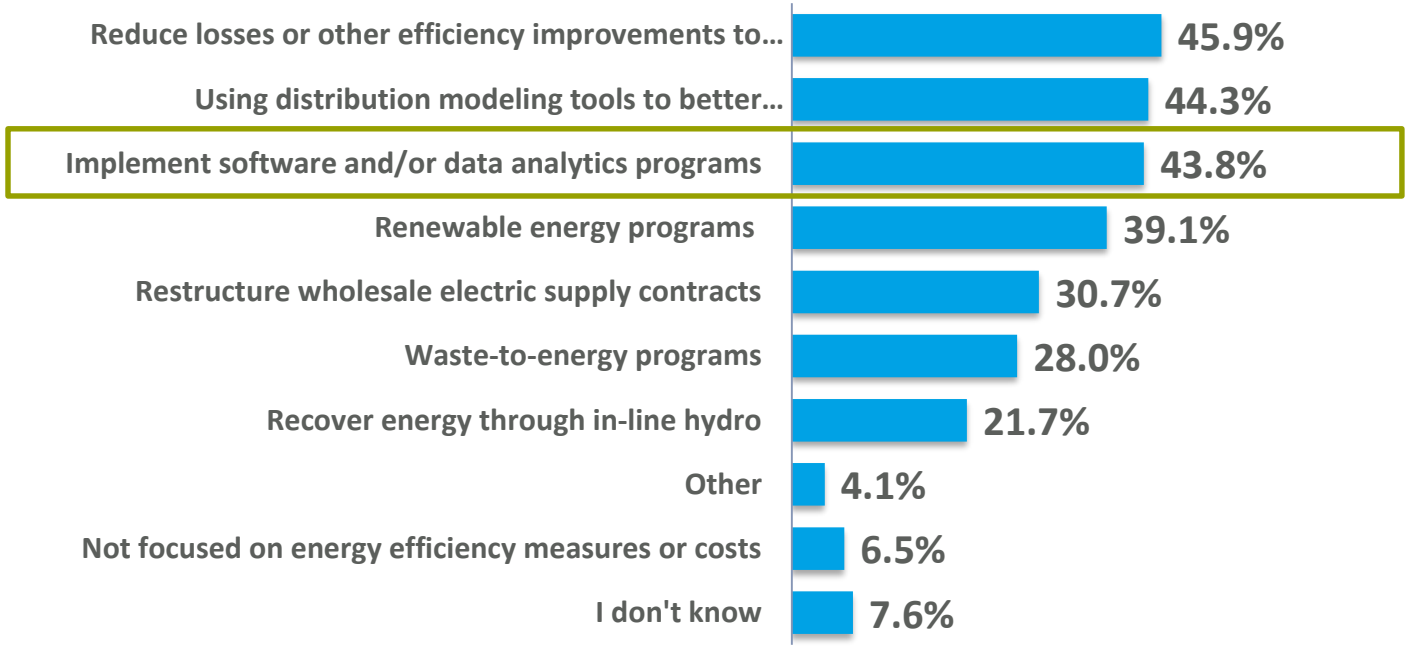
MOST SIGNIFICANT SUSTAINABILITY ISSUES



Source: Black & Veatch 2014 Strategic Directions: U.S. Water Industry

Respondents were asked to select the three most significant sustainability issues for their utility from a broad list of items. This chart highlights the five issues selected most among all respondents.

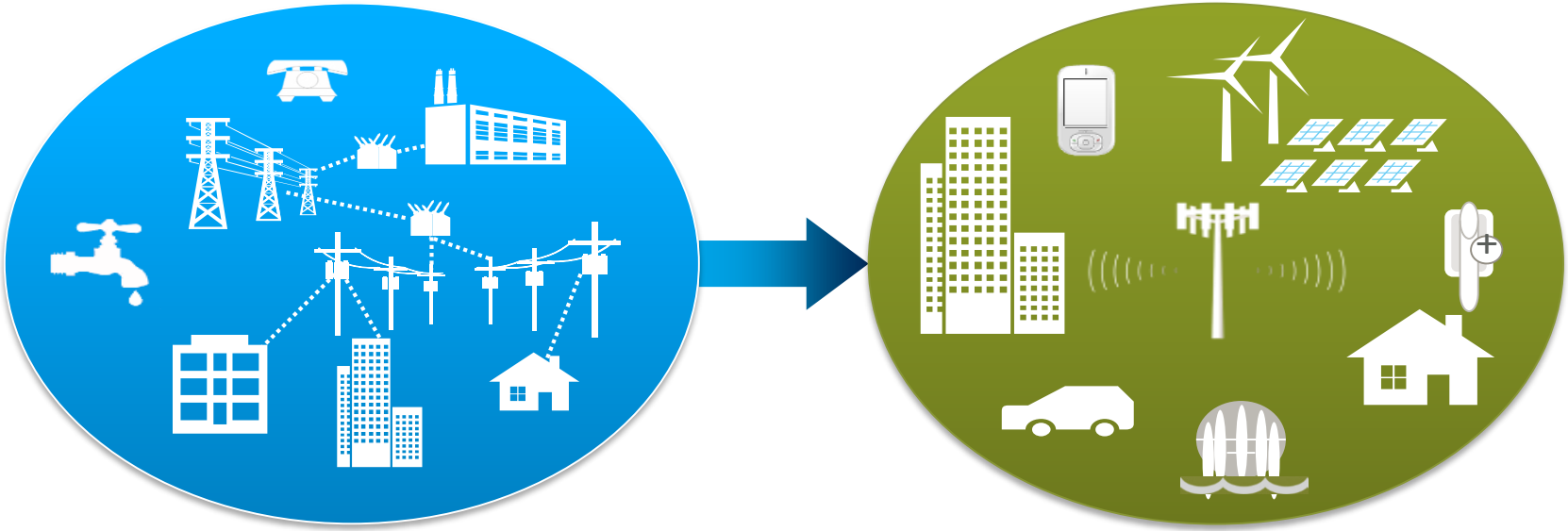
ENERGY EFFICIENCY / RECOVERY OPTIONS CONSIDERED OR IMPLEMENTED



Source: Black & Veatch 2014 Strategic Directions: U.S. Water Industry

Respondents which of the listed items their utility is considering or has implemented in order to proactively manage energy costs.

THE NEXT INFRASTRUCTURE FRONTIER IS DISTRIBUTED AND INTELLIGENT



The *Internet of Everything* is enabling connectivity and coordination across distributed systems

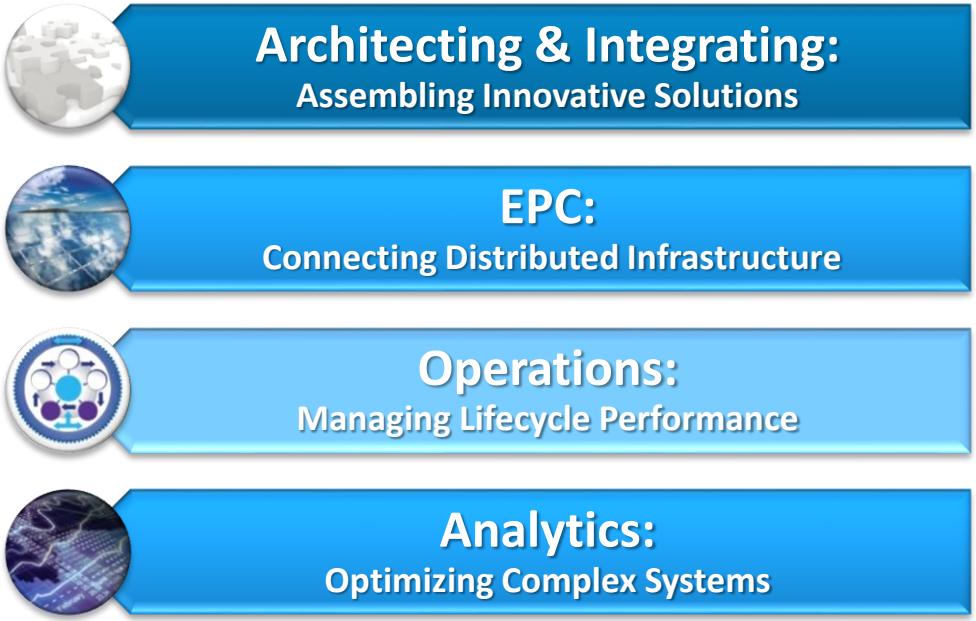
BLACK & VEATCH SMART INTEGRATED INFRASTRUCTURE SERVICES DESIGNED TO CAPITALIZE ON THIS OPPORTUNITY

Smart Integrated Infrastructure (SII):

The convergence of physical infrastructure, communications and data analytics to enable system-wide synergies and value

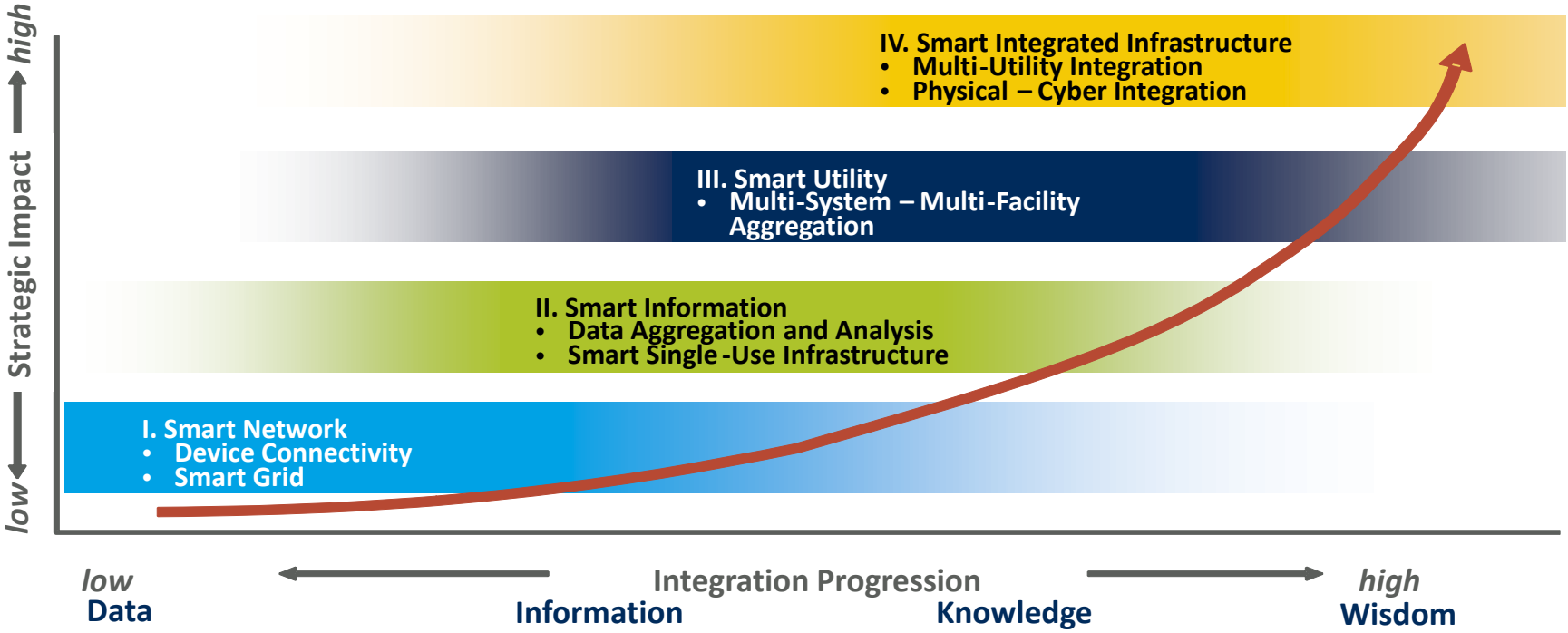
Enabling more efficient, reliable, cost-effective and convenient delivery of essential services

HOW BLACK & VEATCH DELIVERS SMART SOLUTIONS



From end-to-end intelligent infrastructure solutions to analytics and operations

HOW DO WE GET THERE?



Analytics is a journey to value

INTEGRATED DATA MANAGEMENT & ANALYTICS

THE CHALLENGE IS KNOWING HOW TO CONVERT DATA INTO VALUE

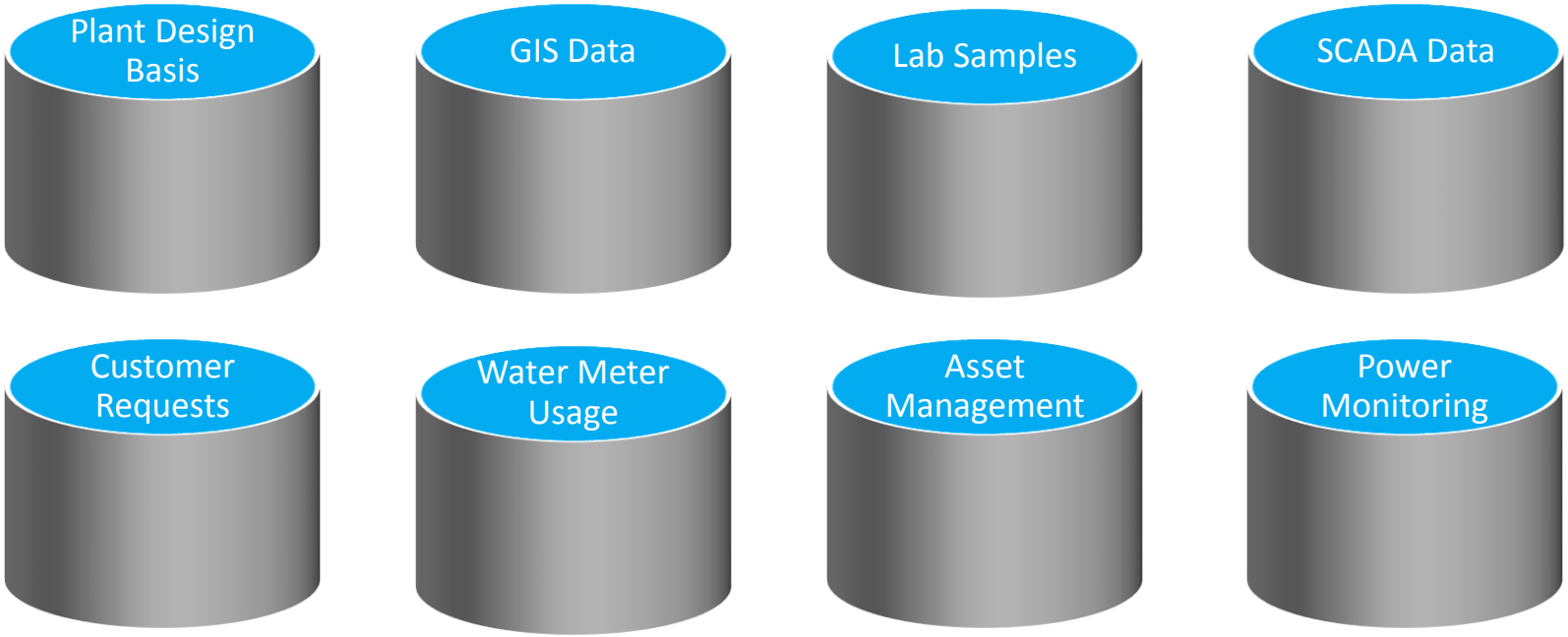
Data

Value

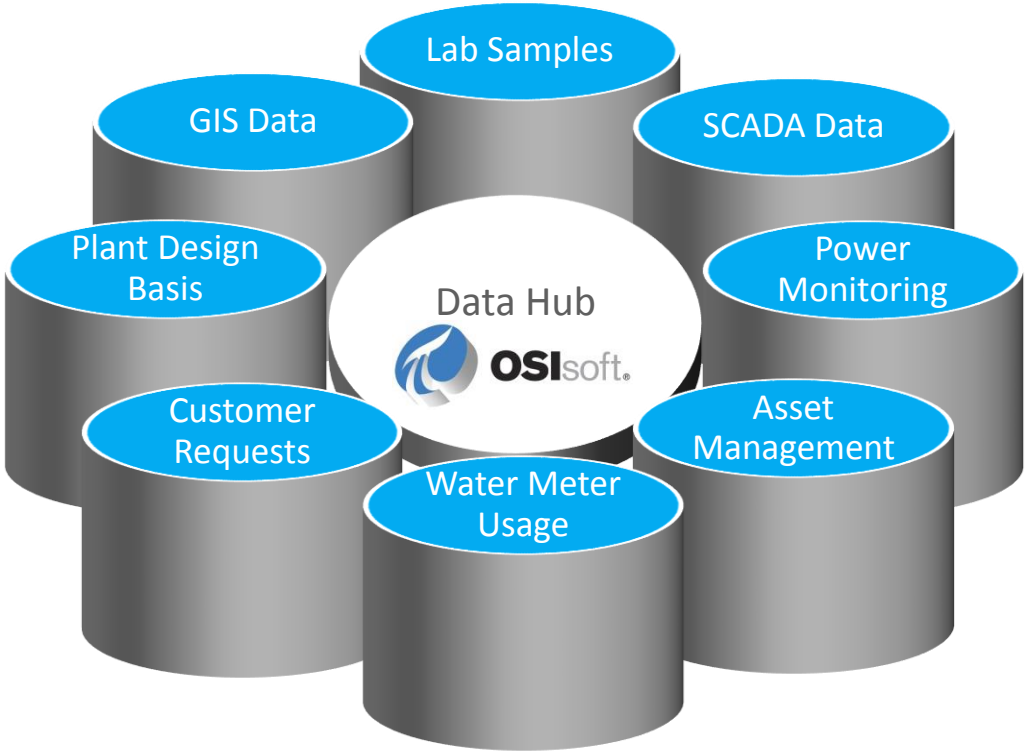
Black & Veatch ASSET360™ Platform

The bridge between data and value

DATA SILOS ARE PREVALENT

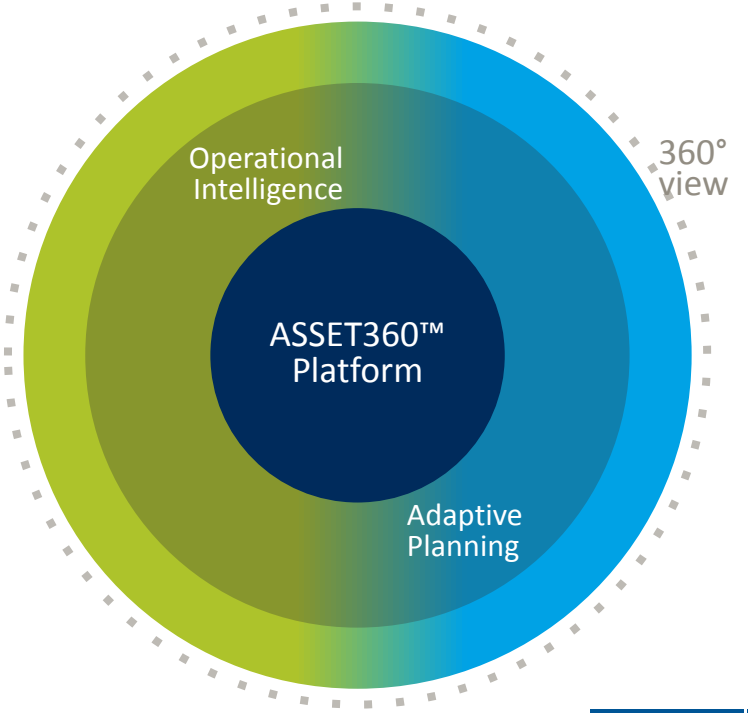


BRIDGING THE DATA SILO GAP



B&V'S ASSET360™ PLATFORM ENABLES BIG ISSUES TO BE SOLVED INCREMENTALLY

- Big Data Management
- Single Point of Truth
- Solution Scalability
- Speed to Value
- Collaborative Problem Solving



World-Class set of technologies, tools and capabilities

ASSET360™ MONITORING & DIAGNOSTICS

- **Collaborative monitoring services range from full scope to shared responsibilities to support of owner operated centers**
  - Improving Performance and Operations while Reducing Business Risk
  - 20+ Years of Experience, 200+ Customers including 120+ Monitored Sites
  - Deep domain knowledge and engineering expertise
  - ASSET360 Platform is basis for integrated Smart Analytics

A PARTNERED OFFERING

Integrated Data (OSIsoft) + Smart Analytics (B&V) = Informed Decisions

PI SYSTEM

ASSET360™

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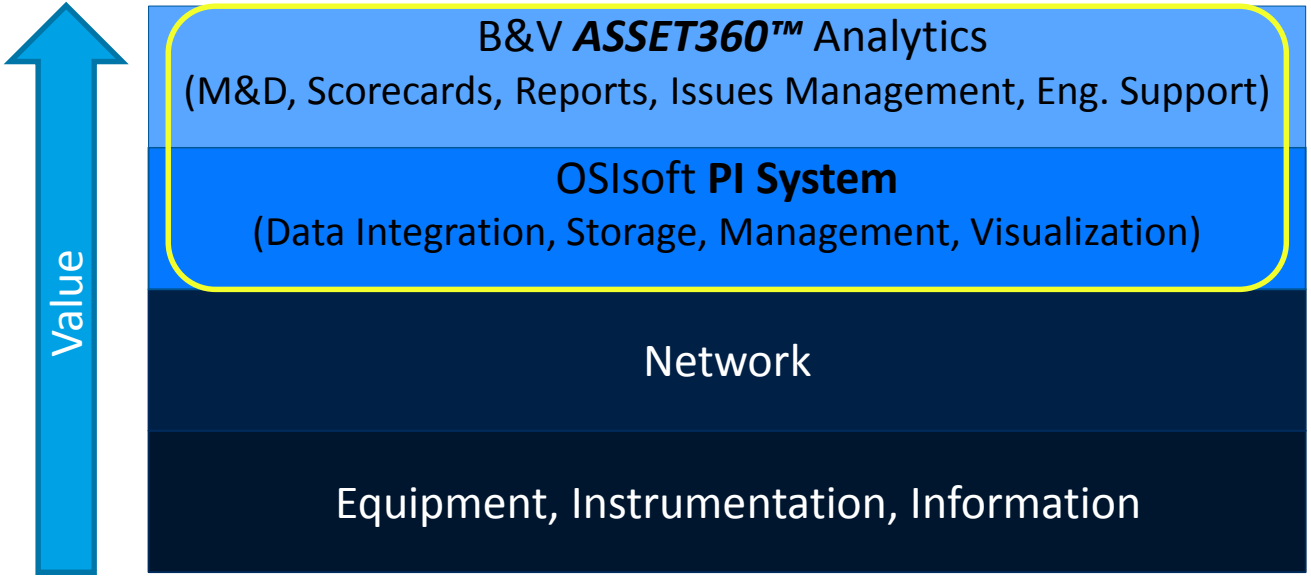
Building a world of difference.

BUNDLED DATA MANAGEMENT AND ANALYTICS



Benefit Areas
Reliability
Service Quality
Efficiency
Performance
Compliance
Risk Mitigation
$$$

DISTRIBUTION SYSTEM ENERGY

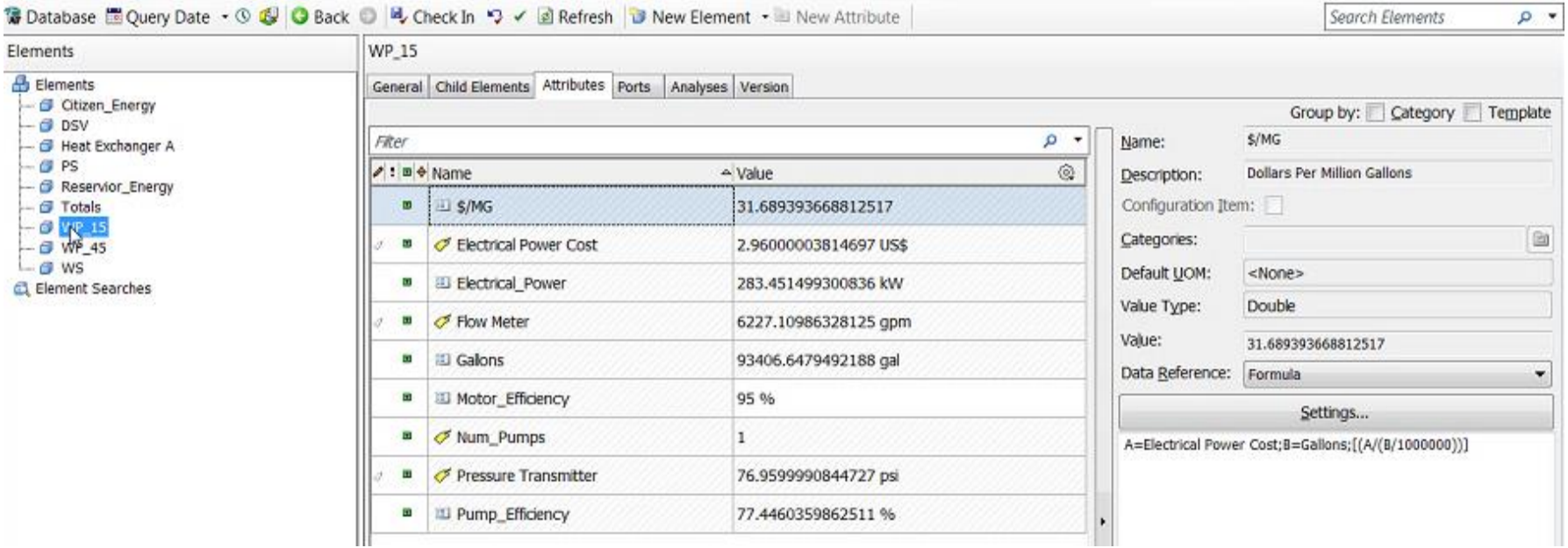
DISTRIBUTION ENERGY SELECTION

- **Pressure zone has a well site and a pump station with reservoir**
  - What is the least expensive source of water based on energy?
- **Minimal information is needed**
  - Flow rate, pressure – SCADA
  - Electric rate – Electric company
  - Pump curves – Design documents

Determine most energy efficient water source

PI AF CALCULATION TEMPLATE

- Electrical cost per million gallons
- (Electrical power cost/(Gallons/1,000,000))



Calculations on calculations on calculations

DISTRIBUTION ENERGY VISUALIZATION

- **Well Site**
  - 34.7 MG
  - 31 mWh
  - $1,855
  - **$53/MG**
- **Pump Station**
  - 32.2 MG
  - 23 mWh
  - $1,649
  - **$54/MG**

Operational flexibility to choose either water source $53/MG vs. $54/MG

DISTRIBUTION ENERGY – A CLOSER LOOK

Well Site

- 34.7 MG
- 31 mWh
- $1,855
- $53/MG
- 1.13 MG/mWh

Pump Station

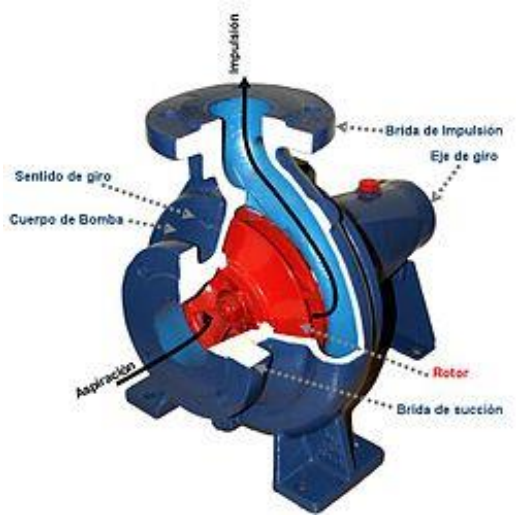
- 32.2 MG
- 23 mWh
- $1,649
- $54/MG
- 1.43 MG/mWh

- **Pump station is more electrically efficient**
  - 1.4 MG/mWh vs 1.1 MG/mWh of electricity
- **Why does cost look the same?**
  - Well site is on seasonal rate
  - Pump station is on time of use
- **Changing billing rate saves**
  - 21% for pump station
  - 10% electrical savings for this pressure zone

Still considering the operational changes

ASSET HEALTH MONITORING

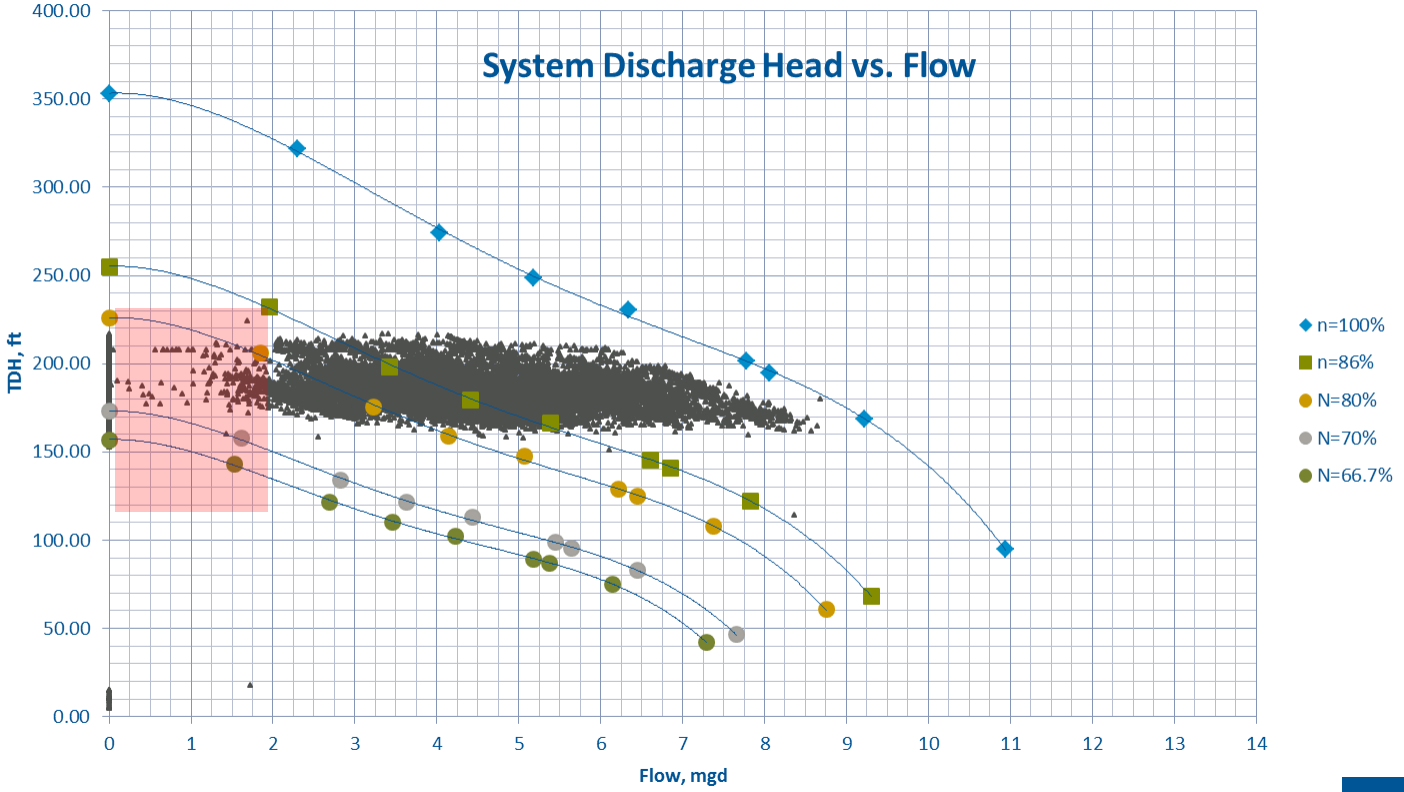
PUMPING ENERGY WASTED



- **Drinking Water Station with Three 250HP Pumps**
  - Three pumps needed more often to meet flow requirement which seems unusual
- **Information Needed**
  - Pump speed, flow rate - SCADA
  - Pump & System Curves – Design Docs

Pump station is 7 years old

PERCEPTION PUMP STATION OPERATING NORMALLY



SCADA data and design data

ENERGY IMPACT

- **Estimated $100,000 of lost energy spinning a pump with no impeller**
- **Challenging to notice because**
  - Electrical energy is not in SCADA
  - Design limits were not programmed
  - Used affinity laws to detect
    - Power ~ speed ^ 3

Bring all VFD data into OSIsoft PI System

PILOT PROJECTS

Leveraging the PI System and B&V ASSET360™ for Water Loss

COMPANY and GOAL

Board of Public Utilities (BPU) Electric and Water Utility of the Unified Government of Wyandotte County,/Kansas City, Kansas wanted to **Find Leaks Faster and Optimize Pumping Energy**

CHALLENGE

Large amount of data in different systems that was difficult analyze

- Analysis was done manually with exporting to spreadsheets
- Some leaks did not surface due to natural soils

SOLUTION

Use the PI system and ASSET360 to bring data together and perform analytics

- Daily water accounting
- Analysis for trends and anomalies
- Predict water use and compare against pumping plan

RESULTS

Just starting 12 month pilot project with district meters and analytics

- Find balance capital investment and data analytics
- Focus leak detection effort
- Apply to entire system

Leveraging the PI System and B&V ASSET360™ for Energy Optimization

COMPANY and GOAL

The City of Lawrence, Kansas provides water and wastewater services and wanted to optimize energy use at its Wastewater Plant

City of Lawrence KANSAS

CHALLENGE

Energy was monitored at plant level but operations staff didn't have view into energy use of each asset

- SCADA system has some information
- Lab system had WQ data
- Not easy to see energy with WQ

SOLUTION

B&V Monitoring and Diagnostics services leveraged by the PI System and ASSET360

- Build standard calculations
- Show energy KPIs
- Use B&V technology experts to remotely monitor energy

RESULTS

Just starting 12 month pilot project of analytics and remote monitoring

- Anticipate energy savings from changing setpoints
- Developing dashboard of KPIs from technology understanding

Integrated Data Management & Analytics

- The opportunity is there……
  - Energy optimization
  - Water loss
- Bring it together as a turn key system will…
  - Increase the speed to value
  - Decrease technology hurdles
  - Allow utilities to focus on their operations

Contact Information

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Black & Veatch

Questions

Please wait for the microphone before asking your questions

State your
name & company

Please don't forget to…

Complete the Survey
for this session

The Power of Data
DECISION READY IN REAL-TIME

Evaluation Form (Seminar Location - Date)

Name:_____ Company: _____

Email:_____

Quality and content of the presentations	Poor	Good	Excellent	N/A
Welcome	○	○	○	○
The Journey To Real-Time Operational Intelligence	○	○	○	○
The Power of Connection	○	○	○	○
Tank Level Management System	○	○	○	○
Using the PI System to Aid in Troubleshooting Operational Aspects of Oil and Gas Well Drilling and Completion	○	○	○	○
Unleash your Infrastructure	○	○	○	○
Information on the Spot	○	○	○	○
Wrap-up/Seminar Conclusion	○	○	○	○

Quality and organization of the seminar				
Choice of date	○	○	○	○
Time allowed for lunch/breaks	○	○	○	○
Choice of presentations	○	○	○	○
Pace and time allowed for the presentations	○	○	○	○

감사합니다

谢谢

Danke

Gracias

Merci

Thank You

ありがとう

Спасибо

Obrigado