

The Impact of IoT on Smart Farming and Water Usage Efficiency

EXECUTIVE SUMMARY

The Industrial Internet of Things (IIoT) is driving efficiencies in large agricultural farming with a focus on efficient use of water. Wegis & Young is a family owned and operated, California-based agricultural conglomerate who have been in business over 100 years. Currently farming over 10,000 acres, they produce diversified crops and manage a business portfolio that includes farm management, property management and agricultural development for outside investors and absentee land owners.

THE CHALLENGE

As a result of the severe drought from 2012 – 2016 in the western United States, California has created new regulations with the passing of the “Sustainable Groundwater Management Act (SGMA)” which establishes framework for sustainable local groundwater management. SGMA affects land owners, agriculture enterprises and all water agencies in California with the goal of bring basins back to balanced levels of pumping and recharge. These new regulations impose pumping restrictions as well as management reporting requirements that are ideal for next generation well monitoring solutions. IIoT systems can help counteract numerous risk factors the agriculture industry faces by introducing a reliable low-cost solution at a fraction of the cost that traditional monitoring devices have been offering for many years.

In addition to water shortages, higher energy prices have changed the crops grown in California. California farms have shifted from growing low value commodity crops like cotton to ones that have higher income like almonds, wine grapes, pistachios, walnuts, and pomegranates. A shift to better-paying crops with lower drought resistance, along with higher water prices, have created the incentive for farmers to invest in water-efficient IIoT technologies.

In summary Wegis & Young needed a cost-effective cloud hosted solution to meet the SGMA mandates with expandability to drive a positive ROI on the overall automation system.

THE SOLUTION



Historically, well site monitoring was costly to deploy requiring multiple boxes for data collection as well as labor-intensive installations that take several days to complete.

Machfu worked with REDtrac, a leader in monitoring critical agricultural systems who have created a cloud-based solution WATERtrac® to simplify the process of deploying systems and collecting data in the cloud. A single gateway box integrates all aspects of data collection and connectivity with the cloud. The self-provisioning IIoT Gateway and standards based wireless sensors reduce the time to deploy from several

days to less than two hours.

This cloud-based solution including WATERtrac®, all monitors all aspects of agricultural well sites including:

- Pumping and standing well water levels
- Energy use – whether electricity, natural gas, diesel or propane
- Energy costs per acre foot based on precise utility time-of-use rates, or the cost of diesel, natural gas or other fuel
- Pumped water by cumulative, flow rate and time interval
- Specific Capacity of wells
- pH and Electroconductivity (EC) for water quality
- Drip lubrication of the pump shaft
- Motor and shaft vibration
- On Demand Pump Efficiency test reports

The REDtrac solution is current deployed at Wegis & Young Ranch is Bakersfield California along with other large agricultural operations in the state. One of the largest agricultural districts in the state has just placed their first order as well.

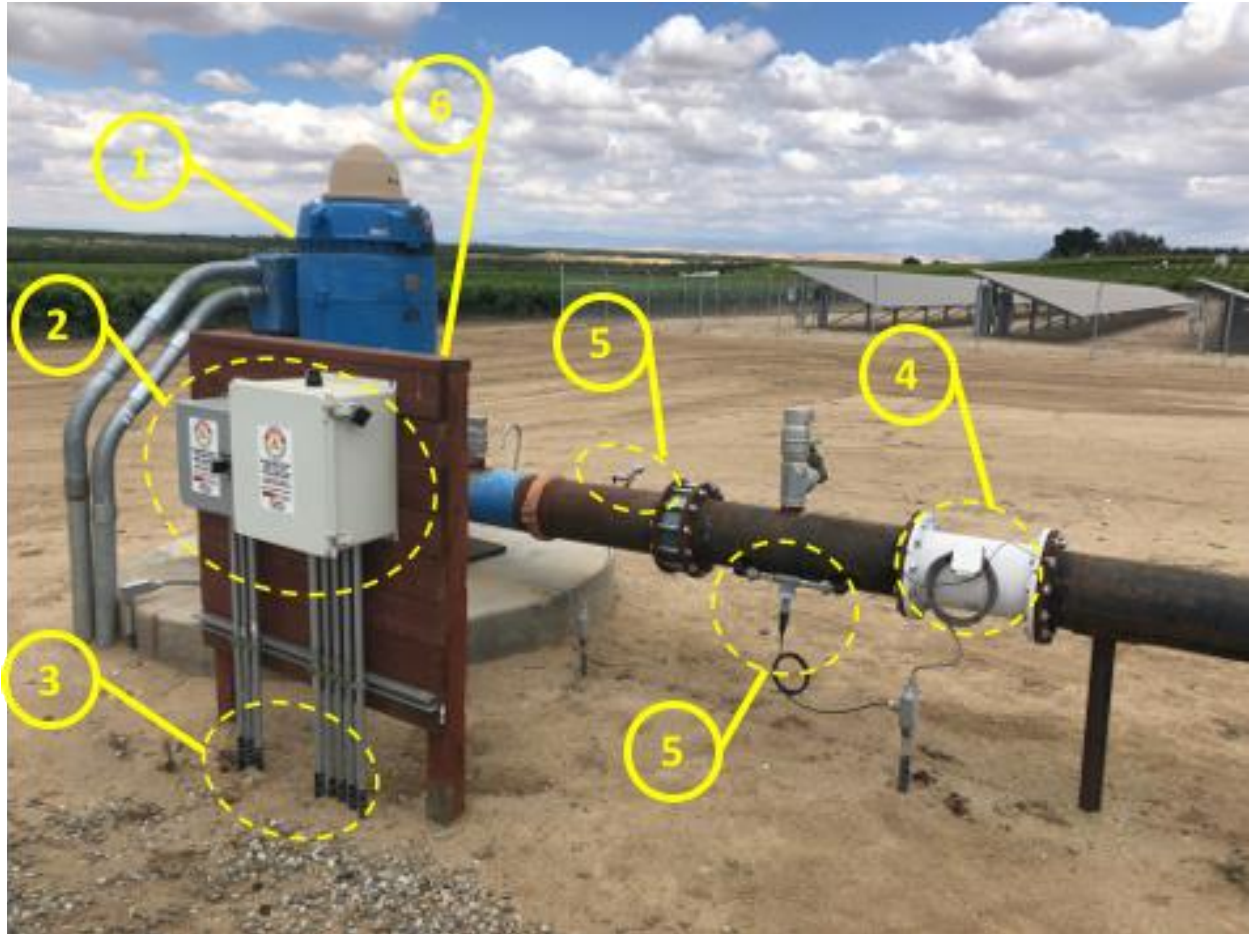


Figure 1: Water Pump System; 1 Pump; Control boxes; 3 Eight hardwired conduits; 4 Flow Meter; 5 Qater Quality Sensor; 5 Pressure sensor; 6 Pump Condition Monitoring

The solution replaced labor intensive hardwired sensor installations with Bluetooth smart sensors eliminating 95% of the installation labor. Smart IIoT sensors gather and send information to the gateway which replaced multiple controllers, IO blocks and modem boxes that had been used in the traditional solutions. The overall result was a system that could be installed at a third of the total cost of tradition automation with added capabilities for new sensing solutions associated with pump monitoring and control, water irrigation system monitoring and electrical usage.

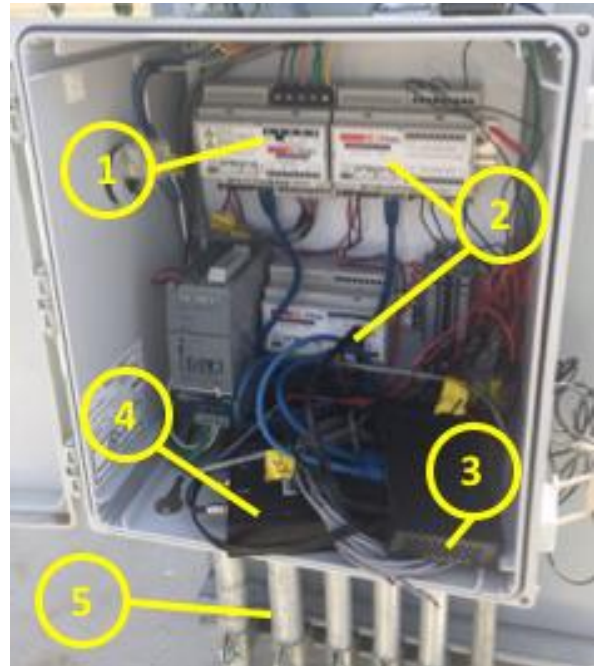


Figure 2: Replaced traditional system; 1 Electric meter, two IO module; 3 Ethernet Bridge; Cellular modem; 5 Six conduit runs

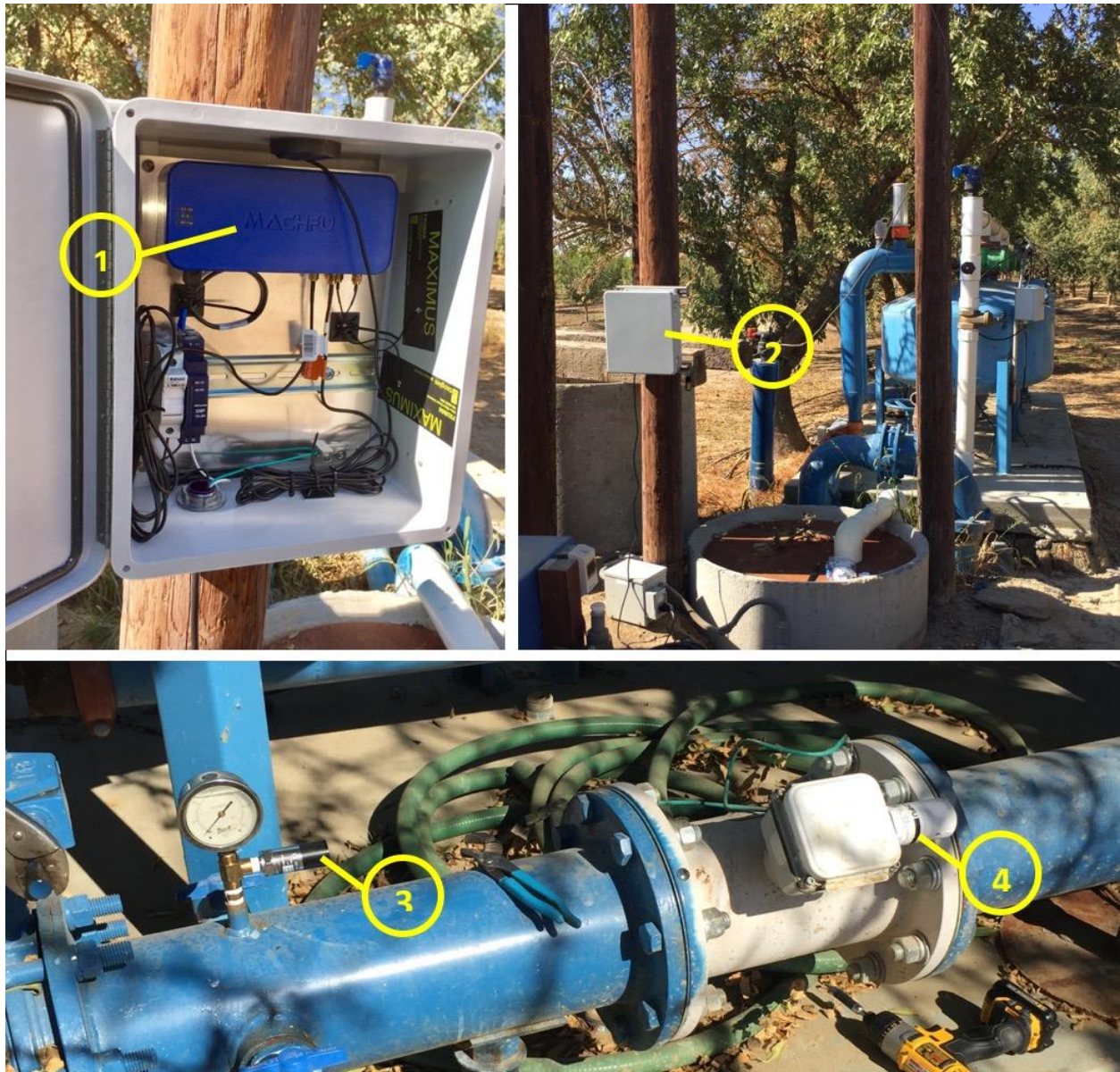


Figure 3: Well Site System, 1 IloT Machfu Gateway; 2 Mounted enclosure, 3 BLE Pressure Sensor, 4 BLE enabled Flow Meter

RESULTS

The Machfu Gateway functionality enable REDtrac to rapidly and cost effectively deploy cloud-based monitoring of agriculture well site operations to meet new DWR regulations, manage water usage and lower overall operational cost. The gateway has the unique ability to integrate data from legacy equipment and modern sensors in a manner that simplifies systems integration significantly reducing installation and maintenance costs while providing high value to end customers.

The resulting benefits Wegis & Young is seeing include tracking and monitoring precise water usage per acre per crop, monitor the decline in efficiencies of wells, allowing to predict and plan for well maintenance, and monitor operational costs. Specifically, the benefits include:

- Reduced installation time and cost: Wireless sensors replace conduit – significantly reducing install time from days to less than two hours
- Reduced monthly monitoring cost: The process used to collect, process and push sensor data to the cloud dramatically reduces cost relative to traditional SCADA
- Simplifies system integration: Simplifies integrating sensors and controls to a unified cloud-based monitoring system and enabled expandability
- Reduced electrical costs: Enables customers to monitor electrical usage and plan around peak power rates reducing power cost by up to 50%
- Reduces unplanned outages and maintenance costs: Condition monitoring of rotating equipment predicts failures enabling planned down time
- Remote maintenance and configuration of control devices: reduces the need to visit well sites to update or adjust control device settings

ABOUT MACHFU

Machfu simplifies the complex landscape of Industrial IoT by easily connecting data at the edge to the cloud and legacy enterprise systems, for business analytics. Our products, the Machfu Platform and Gateway, bring edge to enterprise connectivity to existing industrial infrastructure that can be deployed and scaled quickly

ABOUT THE INDUSTRIAL INTERNET CONSORTIUM

Machfu has been a member of the Industrial Internet Consortium since January 2018. The Industrial Internet Consortium is the world's leading membership program transforming business and society by accelerating the Industrial Internet of Things (IIoT). The IIC delivers a trustworthy IIoT in which the world's systems and devices are securely connected and controlled to deliver transformational outcomes. The Industrial Internet Consortium is a program of the Object Management Group (OMG). For more information, visit www.iiconsortium.org.