

## Internet-of-Things for the Agriculture and Smart Water Markets

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The “Industrial Internet of Things” (IIoT) is driving efficiencies in large agricultural farming with a focus on efficient use of water. 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.

REDtrac a leader in monitoring critical agricultural systems has created a cloud based solution WATERtrac® to 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

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

An illustration of a typical system is shown in the following figure.

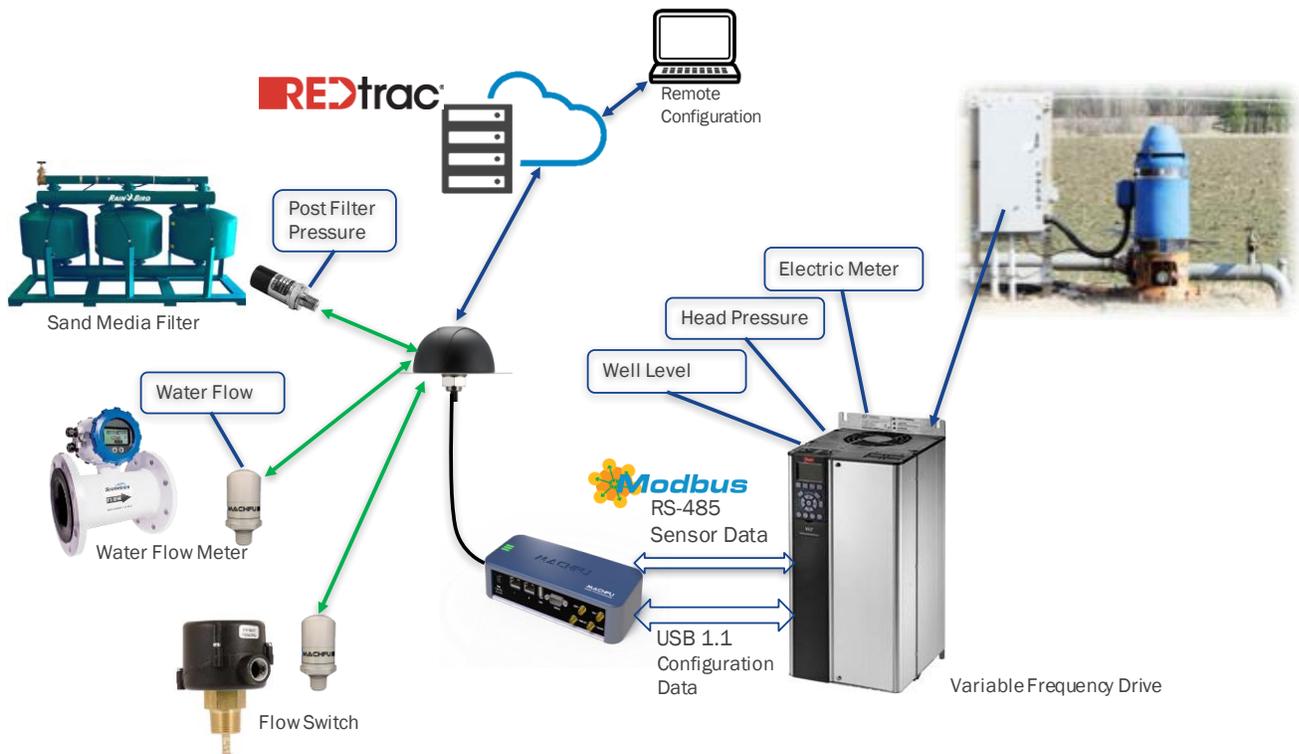


Figure 1: Machfu Gateway serving as an intelligent device to connect different pieces of equipment and sensors to the cloud.

The resulting benefits REDtrac offers to its customers include:

1. **Reduced installation time and cost:** Wireless sensors replace conduit – significantly reducing install time from days to less than two hours
2. **Reduced monthly monitoring cost:** The process used to collect, process and push sensor data to the cloud dramatically reduces cost relative to traditional SCADA
3. **Simplifies system integration:** Simplifies integrating sensors and controls to a unified cloud based monitoring system
4. **Reduced electrical costs:** Enables customers to monitor electrical usage and plan around peak power rates

5. ***Reduces unplanned outages and maintenance costs:*** Condition monitoring of rotating equipment predicts failures enabling planned down time
6. ***Remote maintenance and configuration of control devices:*** reduces the need to visit well sites to update or adjust control device settings

The Machfu Gateway functionality enable REDtrac to rapidly and cost effectively deploy cloud based monitoring of agriculture well site operations to meet new EPA 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.