



INNOVATION IN GROUNDWATER MANAGEMENT

A Business Case Study
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Agriculture is the economic engine for Nebraska. In many parts of the state, production is driven by availability and access to groundwater. Nebraska leads in groundwater management with its 23 Natural Resources Districts. However, monitoring is not cost-effective. The Twin Platte Natural Resources District needed an innovative method to monitor and manage groundwater.

To ensure producers in the TPNRD have sufficient water in the future, the TPNRD needed real-time data monitoring and access to a reliable and affordable network. At first, it appeared cost-prohibitive to implement an integrated management plan.

The district lacked adequate connectivity and initial research showed that traditional methods, cellular and fiber, were far too costly. The TPNRD began exploring innovative methods with Olsson and Ethos Connected.

With no real-time measure... is challenge

Producers in the state of Nebraska are innovators, working to improve water knowledge. Producers still have a set amount of water available for three to five years. The TPNRD, which manages the quality and quantity of groundwater over 320,000 acres in west central Nebraska, would have to manually monitor usage, utilizing more staff hours and insufficient data. In the past the producers, meanwhile, were lacking the reliable, accurate data needed to make strategic, sustainable choices.



THE PROBLEM OF MANAGING RESOURCES

The TPNRD lacked real-time water monitoring in the past because:

- There is no affordable, contiguous communications network to transmit the data
- Cellular solutions are costly
- Cellular connectivity is sparse and not reliable in the district
- Up to 20% of wells in the district are powered by diesel, meaning their usage could not be tracked in real time like their electric-powered counterparts
- There was no open source solution on the market
- Scaling a project across 320,000 acres with multiple users was impossible with current technologies due to cost and proprietary solutions

To address these challenges and work toward a solution, the TPNRD partnered with Olsson, a nationally recognized engineering and design firm, and Ethos Connected, North America's leading LoRaWAN network provider and Internet of Things (IoT) solution company to measure water use and groundwater behaviors.

THE IOT SOLUTION FOR GROUNDWATER MANAGEMENT

Ethos Connected deployed the affordable and scalable technology to provide a robust data set that allowed for the granular evaluation of water management goals:

- Their statewide LoRaWAN network subscription costs just 10% of a standard annual cell subscription.
- Their low-cost, battery powered sensors measure irrigation usage, water applied, and ground water recharge.
- All data can be viewed in real time, enabling farmers to regulate their water usage and avoid potential fines for overuse.

The TPNRD has deployed well over 350 sensors throughout the region during phase 1, with nearly several thousand planned over the life of the project. This scope is far larger than the 20 they planned with a cellular solution. For the TPNRD this innovative network means:

- Decreased expenses of maintaining water supply each year
- Higher reliability and more efficient communication between farmers and the TPNRD
- Access to more accurate, rich data sets on water resources

LoRaWan in Nebraska

Ethos' LoRaWAN® network exists to enable producers to lower their costs with more efficient water, nutrient, feed and soil health data management.

The real-time data collected can offer actionable insight and answers about methodology, sustainability, and stewardship. Benefits for rural and agriculture applications once considered



INSTANT INSIGHTS DELIVERED ON DEMAND



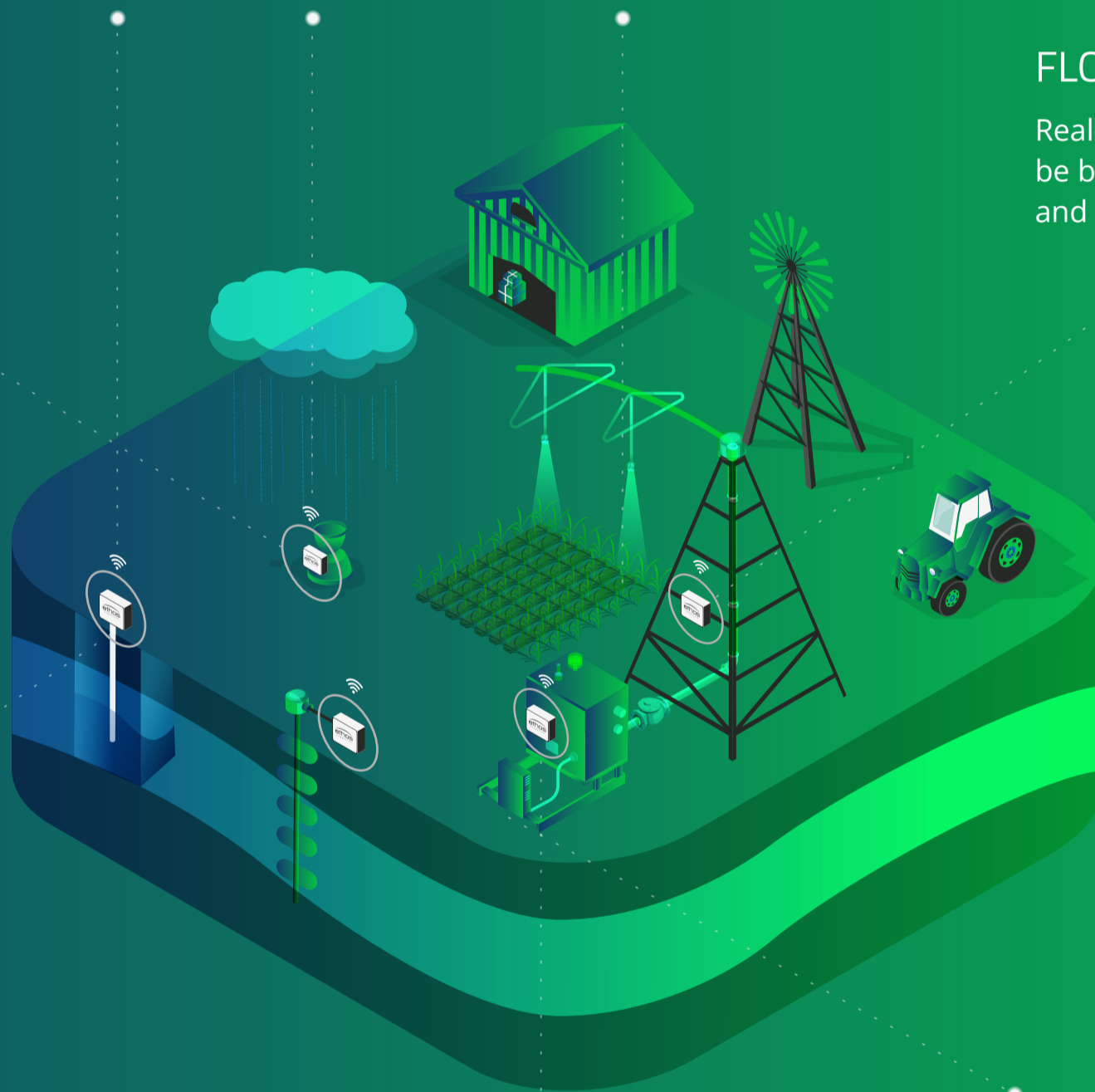
RAIN GAUGE

Tracking real-time rainfall enables smart irrigation management and reduced water usage.



FLOW METER

Real-time data allows for a correlation to be built between irrigation water applied and effects on groundwater levels.



WELL WATER MONITOR

Consistent, real-time groundwater level monitoring delivers an insight into groundwater behaviors once deemed impossible.



SOIL MOISTURE PROBE

Real-time soil moisture levels and root zone needs allow for exact water requirements to be applied, reducing overwatering and run off.



PUMP MONITOR

Remotely monitor the real-time condition of pumps while identifying costly issues before they happen and continuously improving efficiency.

The IoT infrastructure is offering the TPNRD a way to extend the water supply lifespan and ensure longevity in managing natural resources.

POSITIVE OUTCOMES FOR AGRICULTURE

This public-private partnership utilizing the Ethos Connected statewide LoRaWAN network put measurement tools in the hands of the irrigators to better regulate their own water use. The 350 sensors cover 4,300 square miles in Nebraska, bringing the benefits of real time analytics to the furthest corners of farm land.

For the agricultural producers in the region, the IoT infrastructure offers:

- Ability to track their water supply allocation with access to real-time data insights regarding their water use
- Potential for higher crop yields by offering `situational awareness
- Accountability and data needed to respond to water usage audit

Together, Ethos Connected, Olsson and the Twin Platte NRD, put the power back into the hands of producers to support the longevity of Nebraska's agricultural economy and valuable natural resources.



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