ALBERTA INNOVATES

CLEAN RESOURCES FINAL REPORT PACKAGE

Project proponents are required to submit a Final Report Package, consisting of a Final Public Report and a Final Financial Report. These reports are to be provided under separate cover at the conclusion of projects for review and approval by Alberta Innovates (AI) Clean Resources Division. Proponents will use the two templates that follow to report key results and outcomes achieved during the project and financial details. The information requested in the templates should be considered the minimum necessary to meet AI reporting requirements; proponents are highly encouraged to include other information that may provide additional value, including more detailed appendices. Proponents must work with the AI Project Advisor during preparation of the Final Report Package to ensure submissions are of the highest possible quality and thus reduce the time and effort necessary to address issues that may emerge through the review and approval process.

Final Public Report

The Final Public Report shall outline what the project achieved and provide conclusions and recommendations for further research inquiry or technology development, together with an overview of the performance of the project in terms of process, output, outcomes and impact measures. The report must delineate all project knowledge and/or technology developed and must be in sufficient detail to permit readers to use or adapt the results for research and analysis purposes and to understand how conclusions were arrived at. It is incumbent upon the proponent to ensure that the Final Public Report **is free of any confidential information or intellectual property requiring protection**. The Final Public Report will be released by Alberta Innovates after the confidentiality period has expired as described in the Investment Agreement.

Final Financial Report

The Final Financial Report shall provide complete and accurate accounting of all project expenditures and contributions over the life of the project pertaining to Alberta Innovates, the proponent, and any project partners. The Final Financial Report will not be publicly released.

ALBERTA INNOVATES

CLEAN RESOURCES FINAL PUBLIC REPORT TEMPLATE

1. PROJECT INFORMATION:

Project Title:	**Digital Remote Leak Detection and Well Monitoring for Legacy Assets**
Alberta Innovates Project Number:	G2020000125
Submission Date:	August 17, 2021
Total Project Cost:	$989,532
Alberta Innovates Funding:	$200,000
AI Project Advisor:	Bruce Duong

2. APPLICANT INFORMATION:

Applicant (Organization):	**REVIVAL Analytics Ltd.**
Address:	520 3rd Ave SW, Calgary, Alberta, T2P 0R3
Applicant Representative Name:	Henry Cohen
Title:	President and CEO
Phone Number:	1-800-279-1455
Email:	Henry.cohen@revivalanalytics.com

3. PROJECT PARTNERS

Please provide an acknowledgement statement for project partners, if appropriate.

RESPOND BELOW

REVIVAL would like to acknowledge the contribution of Alberta Innovates, Motsai Research, DevFacto Technologies, ACAMP, IRAP and several oil and gas producers (confidential) whose contributions were invaluable in this development.

A. EXECUTIVE SUMMARY

Provide a high-level description of the project, including the objective, key results, learnings, outcomes and benefits.

REVIVAL has developed a system of remote well monitoring and leak detection specifically designed for operators of legacy oil and gas production. The objective was to build a system which has the following key features:

- Wireless in-field communications, allowing sensors to be placed anywhere in up to a 1.5 km range from a base station
- Passive leak detection without the use of cameras or the need for an operator to check the system
- Monitoring of motor status and fluids flow
- Adaptable to oil wells, injectors, pipeline headers and stand-alone locations
- Battery-operated allowing installation by operators
- Flexible cloud communications using LTE, 3G or Satellite
- A mobile app and desktop portal that would be an integral part of an operator's or manager's daily work environment
- Low cost to be affordable on any well moving fluids, even ultra-low stripper wells
- Sufficiently reliable to allow operators to defer frequent site visits

The system has been field tested with several third-party producers and meets the objectives set above. Changes to the technology were necessary during the research phase, particularly with respect to the technology used for in-field communications. These changes included upgrading to a BLE 5.0 module, which provides substantially better range and connectivity as well as lower power consumption. We now can adjust thresholds and set points remotely.

The benefits to a producer are early detection of leaks and monitoring of well conditions, at a cost less than that of two monthly site visits. Alberta and the REVIVAL customer benefit from the extension of the

economic life of wells, preservation of jobs and economic rents and the minimizing of environmental impacts on water bodies and agricultural lands.

Learnings included the chemical characteristics of formation fluids vs run-off water, dead spots in LTE coverage, controlling the system from a mobile app and streamlining the entire process based on user feedback.

B. INTRODUCTION

Please provide a narrative introducing the project using the following sub-headings.

- **Sector introduction:** Include a high-level discussion of the sector or area that the project contributes to and provide any relevant background information or context for the project.
- **Knowledge or Technology Gaps:** Explain the knowledge or technology gap that is being addressed along with the context and scope of the technical problem.

Sector Introduction

Following decades of drilling, there are now approximately 70,000 low-productivity oil wells in Canada, more than 800,000 in the US, and significantly more in Mexico, Russia, China and Australia. Many of these are in high-risk areas, particularly near water bodies. Even greater in quantity are high-risk pipelines and water injection sites. It is imperative that these sites be monitored, as any leak that runs off-lease onto agricultural land or a water body can be environmentally damaging and prohibitively costly.

To effectively manage Legacy Operations, operators visit wells frequently (usually daily), record data manually, while visually verifying conditions, making repairs and adjustments as needed. Operators monitor temperature, pressure, vibration, visual signs of operating conditions and leaks while on a site visit. The timing of such site visits means long periods of data silence, which is inherently risky. Individual operators can exceed 250,000 km/year of driving at great cost, economically, environmentally and from a safety standpoint.

The origin of REVIVAL stemmed from a group of operators of Legacy Wells in Alberta and Saskatchewan. Daily site visits became prohibitively expensive, and remote monitoring systems were both expensive and limited in their ability to provide effective leak detection. Existing systems used cameras which needed to be checked every eight hours. The images were often unclear, particularly in poor weather conditions. Reducing the frequency of site visits is through remote monitoring is only possible with passive leak detection, with sensors placed throughout a site in areas where a leak might occur or to where it might migrate. This is the major hurdle that REVIVAL need to overcome in this Project.

Knowledge or Technology Gaps

Existing technology has two key shortfalls:

1) Requirement for inspection, usually through cameras. This means that a leak must be visible, and an operator must check the image. REVIVAL developed a sensor technology that passively detects leaks and sends an alarm to the operators' mobile device.

2) Cost – existing technology requires significant up-front expense, which is difficult to justify for ultra-low productivity wells. REVIVAL's unique technology and business model eliminates that requirement, through low-cost hardware and low monthly fees.

Requirements	Reason	Technology Gap	REVIVAL Solution
Passive Water Leak Sensing	Automatic sensing of leaks to fill the gap when an operator checks the well status. Alerts if triggered. Water is present in most reservoirs, as well as injectors and transport facilities.	Distinguishing between formation water, rain, snow, and run-off water to minimize false alerts.	Sensor measures water conductivity and temperatures. Algorithms look at rates of change and the presence of environmental factors.
Physical Leak Sensing	Cameras and pressure balance are the standards today. Pressure balance does not detect pinhole leaks. Cameras can only detect what is visible (optically or thermally) and need to be checked by the operator. AI systems to determine leaks are prohibitively expensive.	Needed to develop a low-cost sensor to detect the presence and temperatures of fluids. Must be located anywhere a leak may occur, and work in poor visibility, night, and under snow.	Proprietary "smart sensor" designed with up to 12 individual sensor/thermistor packages, controlled by a microprocessor, which can be cut to size by the operator, and installed in a spiral around a well or pipe, or vertically in a remote location.
Wireless	Wired system must be close to a base unit, and wires spread out on a site pose safety concerns and risk damage.	Needed in-field wireless network, which could be configured easily through a mobile app.	We configured BLE 5.0 to bridge this gap.

Battery Operated	Electrical connections on a site are expensive and require a certified electrician or instrument tech. Electrical connections are limited in location by safety standards.	An LTE Gateway requires substantial power to survey the sensors and report to the cloud.	Algorithm developed to survey sensors every 15 minutes and report to the cloud every 6 hours, unless an alarm is present, in which case the system will send an immediate alert.
Low Cost	Legacy operators are usually cash flow constrained. Existing systems cost a minimum of $2,500 plus installation plus monthly fees.	Build a system at a low enough cost to be economic for any well, no matter how low the productivity.	By avoiding cameras, wires, and electrical connections, and offering the platform on a monthly fee for service basis, an operator can pay for the service by reducing site visits as little as twice/month. There is an immediate positive cash flow effect with no up-front capital.

C. PROJECT DESCRIPTION

Please provide a narrative describing the project using the following sub-headings.

- **Knowledge or Technology Description:** Include a discussion of the project objectives.
- **Updates to Project Objectives:** Describe any changes that have occurred compared to the original objectives of the project.
- **Performance Metrics:** Discuss the project specific metrics that will be used to measure the success of the project.

RESPOND BELOW

Knowledge or Technology Description

Currently available digital technology is too expensive to use for mature wells and does not provide reliable leak detection. The challenge for REVIVAL was to develop a low-cost system that can be applied to stripper wells. Not only must the hardware be low cost, but the installation must be done by field operators, thus be wireless and battery-operated. This required testing several communication technologies in the field and developing an imbedded firmware system to provide the required information without excessive power draw. Our sensors, named VTL's (Vibration, Temperature and Leak Sensors), are small, certified devices with built in thermistors, accelerometers and BLE 5.0. In addition, we have external sensors offering leak detection, thermistors and/or current measurement which allow us to minimize the number of VTL's required. These communicate to our base station (gateway) which then relates data to the cloud. To optimize battery life, our VTL's constantly monitor their sensors. But report to the base only every 15 minutes. The base relays the data to the cloud every 6 hours, unless an alarm is detected, in which case it would be immediate. Data is reported on a proprietary mobile app, as well as a desktop program. Our mobile app guides the operator through installation and provides push notifications for any anomaly detected.

Updates to Project Objectives

Since the entire project had to be delayed to accommodate the switch to BLE 5.0 technology, the Data analytics portion will now occur after the project is complete. The other objectives in the original proposal have been achieved.

Performance Metrics

The key performance metrics are:

1) Stability of VTL to Base connections – we have not had any VTL's lose connection in two months of field trials. All have been reporting at the pre-designated intervals.

2) Stability of Base Connection to Cloud – in one instance, a well was in a dead spot since LTE was not available. We have upgraded the modems to allow for a fallback to 3G in such circumstances.

3) Stable motor status – our vibration sensors have been 100% accurate on tests, and also detected a motor shutdown in the field trial. The operator was notified and repaired the motor in short order.

4) Leak False Alerts – no false alerts were reported. Leak detection has only been tested and validated in the lab, using formation fluids, rain water and distilled water. There have not been leaks on any of the test sites in the field.

5) Extreme Temperature Performance – while the system had been tested to -40˚C in an environmental chamber, we had the opportunity to test in +45˚C in the field. Performance was unaffected.

D. METHODOLOGY

Please provide a narrative describing the methodology and facilities that were used to execute and complete the project. Use subheadings as appropriate.

RESPOND BELOW

Methodology

The development was an iterative process cycling between the field, engineering, software development and business strategy. The key for success is field buy-in, and that was the starting point – what do they need and will actually use? Hardware engineering was done in house by our engineer, though certain aspects were outsourced, particularly the initial use of BLE 5.0. Embedded firmware was largely done in house

Facilities

Most of the technical development was completed at in-home labs by REVIVAL engineers. The final build of the VTL was done at Motsai Research in Montreal, a company with deep expertise in BLE 5.0 technology. Environmental testing was done at ACAMP in Edmonton. Certification was done by QPS in Edmonton at their labs.

E. PROJECT RESULTS

Please provide a narrative describing the key results using the project's milestones as sub-headings.

- Describe the importance of the key results.
- Include a discussion of the project specific metrics and variances between expected and actual performance.

RESPOND BELOW

In Milestone 1, we conducted three field tests using 2.4 GHz radios, finding limits to the technology in areas where there were large metal obstructions. During our last test, we concluded that Bluetooth Low Energy 5.0 meets all the criteria we require for wireless in-field communication. Collaborating with Motsai Research, we developed a new VTL and Base Station to accommodate this technology. We also developed the Proof-of-Concept software and Mobile App using DevFacto Technologies.

In Milestone 2a, we built and tested 40 VTL units and completed the extreme conditions tests of the Base Station. These tests resulted in changing out our Single Board Computer to a more robust version that we identified and sourced through Technologic. We defined and established our assembly protocols and documented the process. We had all the equipment delivered and began assembly. Concurrently, we further debugged the software and mobile app.

For Milestone 2b, we completed the manufacturing of 10 base stations, sensors, and installation hardware. We signed Field Trial Agreements with two mid-sized Alberta-based oil producers. We installed 8 systems on their sites, which tested oil producing wells, water injectors and pipeline headers. Total installed equipment included 8 base stations, 21 VTL's, 18 leak sensors, 2 temperature sensors and 2 electrical current sensors. We kept 2 systems on local sites for control testing. We have been collecting data since June 25, 2021. Feedback from customers has been very favourable.

F. KEY LEARNINGS

Please provide a narrative that discusses the key learnings from the project.

- Describe the project learnings and importance of those learnings within the project scope. Use milestones as headings, if appropriate.
- Discuss the broader impacts of the learnings to the industry and beyond; this may include changes to regulations, policies, and approval and permitting processes

RESPOND BELOW

Several useful data points were learned from the field trials, and will be incorporated into the commercial product:

1) In-Field Communications – BLE 5.0 worked flawlessly – there were no incidents of communication failure on any systems.

2) Cloud Communication – on one of ten sites, we found an LTE cellular dead spot. We suspect this will recur, despite the areas showing LTE coverage. Our modems do not have the capability to fall back to 3G, which works in the dead spot. We are now testing new modems with 3G fallback and will replace the existing modem.

3) Temperature Measurements – we learned that temperature measurements as a proxy for flow in a pipe are only effective in cooler ambient temperatures. Our field trial had been occurring during a period of record ambient temperatures, approaching 40 degrees C. This caused false alerts. We will be continuing to use temperature measurements for leak detection and have begun researching acoustic sensors for flow measurement.

4) Physical Installations – Our magnetic VTL's worked extremely well and made installation easy to do. We will be pre-installing magnets on all devices in future to avoid the need for the operator to do so in the field. Our original design for the spiral leak sensor proved too bulky for smaller diameter pipes. We redesigned the housing to a stiffer, smaller format which works very well. We also tested offset pipe clamps which keep the spiral housing on a slope allowing for drainage. This was very effective, and we will now design custom clamps for commercial sales. The battery shelf on our stands worked well but was a bit flimsy. This will be strengthened in future. Solar charging will also be added.

G. OUTCOMES AND IMPACTS

Please provide a narrative outlining the project's outcomes. Please use sub-headings as appropriate.

- **Project Outcomes and Impacts:** Describe how the outcomes of the project have impacted the technology or knowledge gap identified.
- **Clean Energy Metrics:** Describe how the project outcomes impact the Clean Energy Metrics as described in the *Work Plan, Budget and Metrics* workbook. Discuss any changes or updates to these metrics and the driving forces behind the change. Include any mitigation strategies that might be needed if the changes result in negative impacts.
- **Program Specific Metrics:** Describe how the project outcomes impact the Program Metrics as described in the *Work Plan, Budget and Metrics* workbook. Discuss any changes or updates to these metrics and the driving forces behind the change. Include any mitigation strategies that might be needed if the changes result in negative impacts.
- **Project Outputs:** List of all obtained patents, published books, journal articles, conference presentations, student theses, etc., based on work conducted during the project. As appropriate, include attachments.

Project Outcomes and Impacts

The project bridges the knowledge gap related to technology that will meet the objectives of reducing the frequency of site visits and providing immediate alerts in the event of a leak. To achieve this, we needed leak detection (i.e., no visual inspection required), a battery-operated system (operator-installed) and in-field wireless communications (ability to place sensors anywhere on a site). This was accomplished using BLE 5.0 technology and a series of algorithms to minimize battery draw and distinguish between leaks and other sources of water.

Clean Energy Metrics

Metric	Target	Actual
Data-enabled Innovation	Targeting high quality pattern recognition data to assess machine health.	Accumulated 8 weeks of data and hiring data consultant to begin the analytics process.
Digital Transformation and Clean Technology	Target is to build sufficient confidence in the reliability of the monitors and leak sensors to result in reduced driving by at least 25%.	Field trial partners' confidence is building. They have not yet changed behavior, though expect to do so as testing progresses.
TRL Advancement	Take TRL from 4 to 9	Currently 9
# Field Pilots	30-50 systems to be deployed on Bow River sites, including well monitoring, leak detection and data gathering	Bow River is no longer in business. We have installed 8 base stations, 21 VTL's, 18 leak sensors, 2 temperature sensors and 2 electrical current sensors on customer sites. Two systems are installed locally for testing.
# Existing Jobs Retained	5	We currently employ 9 people
Projected New Jobs	15-25	On commercial launch, we now expect 15-20 staff will be needed
# New Products/Services	2 new products and 3 services	Developed 3 new products (base station, VTL, leak sensors).
Partnership Agreements	Long term contract with Bow River Energy	Developed partnerships with several oil and gas producers, DevFacto Technologies, Motsai Research
GhG Emission Reduction	Based on reduced driving. Ramping up from 5 ktonnes in 2021 to 10 in 2022 then to 20 annually. Higher estimate is based the above but 57 ktonnes/year in 2023 to 2030 (monthly vs every three days site visits).	Unchanged goal

Program Specific Metrics

Metric	Target	Actual
Intensity Cost Reduction on Commercial Deployment	Labour costs equate to $5-6/boe on mature assets. Initial target is 1/3 reduction or $2.00/boe.	New calculations suggest on more mature wells, labour costs can approach $25/boe and REVIVAL can reduce that by up to $10/boe.
Energy Intensity Reduction	Estimates GhG emission reduction of 4 ktonnes/yr/site initially, at one visit every three days. That could triple at target use.	Reliability of the REVIVAL system suggests that site visits can easily be reduced to once/week or less. The GhG savings could be double or triple the original estimate.
Reduction in Landscape Disturbance and Improvement in water use	Identification and rapid response to all leaks at site. Reduce response time from up to 24 hours down to 30 minutes	As expected.

Project Outputs

Other than the AI announcement, we have not issued any communications. The terms of our field trials involve mutual confidentiality. We have created a basic web site (www.revivalanalytics.com) and a LinkedIn page (https://www.linkedin.com/company/35555034/admin/)

H. BENEFITS

Please provide a narrative outline the project's benefits. Please use the subheadings of Economic, Environmental, Social and Building Innovation Capacity.

- **Economic:** Describe the project's economic benefits such as job creation, sales, improved efficiencies, development of new commercial opportunities or economic sectors, attraction of new investment, and increased exports.
- **Environmental:** Describe the project's contribution to reducing GHG emissions (direct or indirect) and improving environmental systems (atmospheric, terrestrial, aquatic, biotic, etc.) compared to the industry benchmark. Discuss benefits, impacts and/or trade-offs.
- **Social:** Describe the project's social benefits such as augmentation of recreational value, safeguarded investments, strengthened stakeholder involvement, and entrepreneurship opportunities of value for the province.
- **Building Innovation Capacity:** Describe the project's contribution to the training of highly qualified and skilled personnel (HQSP) in Alberta, their retention, and the attraction of HQSP from outside the province. Discuss the research infrastructure used or developed to complete the project.

RESPOND BELOW

Economic

Canada's conventional energy sector is relatively high cost globally, due to the maturity of the basin, high levels of regulatory burden, strong environmental standards, Indigenous relations, carbon taxes, pipeline capacity limitations, and a general shift of investors, lenders, and insurers away from the carbon sector. Of the major oil producing nations, Canada ranks fifth most costly, at quadruple the cost of Saudi Arabia, the lowest cost producer (Source: Rystad Energy Ucube). Because of Canada's focus on these issues and geographical realities, the cost structure has risen to make Canadian conventional production marginal. However, it remains a major contributor to Canadian GDP and employment. For that to persist, the industry must adapt to new realities by addressing the environmental impact and costs in the context of the structural realities mentioned. While the Canadian industry is among the most disciplined and regulated globally, reductions in costs and environmental impact are paramount.

REVIVAL's solution addresses many of these realities. Most important is the early detection of spills, thereby limiting the environmental impact. In Alberta alone, there have been more than 2,000 reportable spills since June 2013. These cost upwards of $25,000-50,000 to remediate (many exceeding $500,000), and if water bodies are involved, have cost more than $150 million. In addition to the direct remediation costs, leak detection could positively affect insurance availability and rates. By installing REVIVAL's leak detection, the need for site visits will be reduced, thereby contributing to a company's ESG goals and reputation, improving access to capital.

Direct unit costs can be dramatically reduced, as shown in the chart found in Question 9. Average Operating Costs in Canada are US$27/barrel and shifting to weekly vs daily visits could reduce costs by as much as $10/barrel, or more than 35%. By reducing costs, Canadian conventional oil becomes more competitive globally, which is critical to a global commodity.

The global market for remote monitoring of Legacy Assets is large, with 4.4 million sites in Canada and the US alone. Other mature basins, particularly those where environmental standards are high, include Mexico, Australia, and Europe. Less regulated basins such as South America, China and former Soviet Union also represent a large export market for REVIVAL.

Regionally, Canada needs to have a strong Prairies. To achieve that, not only do the driving economies need to thrive (energy, agriculture, resources), but the economies need to diversify from resource extraction and agriculture and build technology capabilities. Alberta is establishing itself as a technology hub, and REVIVAL is contributing to the shift, training, and knowledge base.

REVIVAL brings 15-20 highly skilled jobs in the near term, and potentially 50 over time. By extending reserve lives of properties, jobs are maintained both I the field and at the office.

Environmental

REVIVAL's technology has material social and environmental benefits. First, with respect to early leak detection, the application of our sensors can dramatically reduce the volumes of leaked fluids, including salt water, which can be more harmful to soil and water bodies than oil. At a well site, small drips can be detected before reaching the ground and dealt with immediately. The second stage detector would be triggered when the ground at the wellhead is affected, the third when the leak has spread to the lease edge. By reducing the volumes of leaked fluids, the impact on water bodies and native soils are mitigated, and the clean-up costs are substantially reduced.

Second, we expect at least a 30% reduction in site visits, though over time, as the system is more trusted by customers, visits can be reduced by more than 90%. At the 30% reduction, assuming a 10% market share, Greenhouse Gas emissions would be reduced by 20 ktonnes of CO2e annually, or the equivalent of removing 4,000 cars from the road.

Reduced "windshield time" improves safety, operator fatigue and allows operators to focus on higher-level maintenance and optimization. Costs could be reduced by having internal operators conduct certain projects, such as oil changes for example, rather than using third party contractors. Overall, equipment would be at a higher state of repair, improving run time and optimizing recovery from existing wells.

Social

Environmental, Social and Governance (ESG) have become key factors in all aspects of business, but particularly in oil and gas production. Producers are faced with a rapid withdrawal of investment in the sector, as many institutional investors are under pressure to divest from companies perceived as weak in ESG. Lenders and insurance companies are in a similar position. REVIVAL is contributing to the ability of legacy well operators to improve their ESG, while instantly saving capital.

REVIVAL is demonstrating that the drive by Alberta to create a thriving technology sector is seeing success. Oilfield workers become more technologically knowledgeable, and jobs become more sustainable. Demand for hardware and software helps build HOSP personnel in Alberta, and locally sourced manufacturing at this scale can be very competitive.

I. RECOMMENDATIONS AND NEXT STEPS

Please provide a narrative outlining the next steps and recommendations for further development of the technology developed or knowledge generated from this project. If appropriate, include a description of potential follow-up projects. Please consider the following in the narrative:

- Describe the long-term plan for commercialization of the technology developed or implementation of the knowledge generated.
- Based on the project learnings, describe the related actions to be undertaken over the next two years to continue advancing the innovation.
- Describe the potential partnerships being developed to advance the development and learnings from this project.

RESPOND BELOW

REVIVAL is planning to launch commercially in Q4 2021. We believe the technology we have developed is now ready for customers. The sales cycle is long, and we expect to begin installations in Q1/Q2 2022.

The next phase of our development is moving the software and mobile app from its current state to a fully functioning ecosystem, including data analytics, e-commerce and data sharing.

Beyond that stage, we are developing new hardware for satellite communications, solar charging for base stations, sensors for tank level measurements, acoustic sensors for fluids flow, acoustic sensors for natural gas well monitoring, site security and geotracking.

J. KNOWLEDGE DISSEMINATION

Please provide a narrative outlining how the knowledge gained from the project was or will be disseminated and the impact it may have on the industry.

RESPOND BELOW

The knowledge gained will be disseminated through commercial sales, resulting in a new business, job creation, environmental benefits and reduced costs and risk for customers.

K. CONCLUSIONS

Please provide a narrative outlining the project conclusions.

- Ensure this summarizes the project objective, key components, results, learnings, outcomes, benefits and next steps.

RESPOND BELOW

The initial objective of the Project was to build a system of remote well monitoring and leak detection specifically designed for operators of legacy oil and gas production. The specific requirements are low cost, no upfront capital, ability to manage the risks associated with high water volumes and the desire to reduce site visits. The key to success was to develop a wireless, battery-operated system with reliable leak detection which would allow operators of legacy oil wells to reduce the frequency of site visits. REVIVAL succeeded in meeting these objectives by applying learnings on in-field radio transmissions, cloud connectivity, battery technology, embedded firmware, and leak sensor development. The benefits to a customer are the minimizing of environmental impact on water and agricultural lands, reducing GhG emissions through fewer site visits, extending the life of existing assets and reducing costs. The next steps are to finalize the software and mobile app, develop the data analytics system and further develop new and lower-cost hardware.