ALBERTA INNOVATES

CLEAN RESOURCES

CLEANER HYDROCARBON PRODUCTION

DIGITAL INNOVATION IN CLEAN ENERGY

Dynamometer Classification and Machine Learning Identification of Real-Time Well Behavior for the Digital Oilfield – Phase I

This project accelerated development of Akine's machine learning analytics required to fully automate artificial lift behavior identification, an integral part of providing real-time well performance data. Knowledge of real-time well behaviour is necessary to fully automate artificial lift operations, maximize productivity, decrease energy intensity and reduce GHG emissions associated with upstream oil production. This technology provides a meaningful step towards; lowering emissions from Alberta's conventional and tight oil production; leveraging data enabled technology to decrease lifting costs, increase profitability and supporting innovation in meeting Alberta's energy needs and growing social acceptance of Alberta oil in global markets.

FUNDING DETAILS

RECIPIENT:
Akinê Well Optimization Services Inc.

PARTNERS:
NRC – IRAP & Various Industry Partners

TOTAL BUDGET:
$1,169,751

AI FUNDING:
$480,870
TIER

PROJECT DATES:
MAR 2020 – AUG 2021

PROJECT TRL:
Start: 4
End: 7

APPLICATION

Akinê's IIoT oil well automation equipment captures real-time well operating data and autonomously controls well operations using the Akinê Live cloud platform analytics augmented by machine learning. One of the functions of our ML algorithms is to identify and classify, in real-time, adverse changes in operating conditions. We generated a data pool of critical downhole well behaviours for development, training, refining and validating of our ML algorithms. Once deployed to Akinê Live, these ML algorithms will identify system behaviour and autonomously control and adjust artificial lift operating parameters to improve its efficiency.

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PROJECT GOALS

- Expert classification of the most common downhole pump behaviours for actively operated oil wells with reciprocating artificial lift in Western Canada to generate training data sets for ML algorithms
- Development of ML algorithms to autonomously identify the most common undesirable artificial lift behaviours
- Training and refining of ML algorithms to achieve high accuracy as required for autonomous control system
- Deployment and testing of ML algorithms in a real operating environment on a large number of wells to verify their accuracy and effectiveness

BENEFITS TO ALBERTA

- Increased cumulative hydrocarbon production from new and existing wells
- Reduced energy intensity of artificial lift
- Decreased lifting costs and increased profitability of conventional and tight oil production
- Reduced GHG emissions associated with energy intensity and intervention intensity of artificial lift
- Increased tax and royalty revenue from increased hydrocarbon production
- Providing cutting-edge data enabled technology from Alberta to solve Canadian and global challenges

6 HQSPs trained

10 Project Jobs

60 Future Jobs

1 New Product/Service

430 T/yr Project GHGs Reduced

26,500 T/yr Future GHGs Reduced

CURRENT STATUS

AUG 2021

Real-time ML identification of critical well behaviours and resulting autonomous modification of well operation is critical to maintaining peak artificial lift performance while driving down energy intensity and associated GHG emissions. We successfully identified 57 undesirable reciprocating artificial lift behaviours, selected 20 for autonomous identification algorithm development, and collected and verified over 23,000 associated data buffers. We developed, tested and refined machine learning algorithms that autonomously identify 14 behaviours with 80% accuracy and have deployed those to our Akinê Live cloud optimization platform.