Disclaimers
Outline

• Tell you what I’m going to tell you
• Tell you
• Tell you what I told you
A Picture is Worth a Thousand Words
When Life Gives You Lemons
Repsol - Global Initiatives

Oil and Gas Climate Initiative

World Bank Group

Climate & Clean Air Coalition

Principles for Responsible Investment
GHG Strategy

Context
- Voluntary Global Climate Change initiatives
- Evolving regulations: Alberta Climate Leadership Plan and Act; Canada’s Pan-Canadian Framework
- 45% reduction of methane emissions by 2025

Repsol’s Approach
- GHG Reductions in all countries
- Focus on energy efficiency
- Key role of natural gas

CBU Strategy
- GHG reductions in our operations
- Venting and fuel reduction opportunities
- Changes of equipment and design standards
- Multiyear cost-effective strategy
- Fugitive emissions management

Collaboration
- Opportunity for collective collaboration on creating a more sustainable energy future through technological innovation (Industry, Government, Academia)
• Collaboration with Calscan and through funding support from Sustainable Development Technology Canada (SDTC) and Emissions Reduction Alberta (ERA), Repsol agreed to participate in an NZEWCS deployment

• Key differentiators:
  • Remote Terminal Unit (RTU) modifications to Repsol standard RTU deployment
  • Hybridization of the power system to allow for solar AND fuel cell supplement to ensure year round performance
  • Advanced low power electronic linear actuators on standard linear control valves for inlet and outlet control.

• Two sites selected near Edson
Hybrid NZE WCS

Awarded $1.94 MM grant to develop & deploy 15 “Near Zero Emission Well Control Systems”

SAFCell 50W Generator

Runs on methanol; easy to install; cold temp. capable

Calscan Solar Electric Well Control System

Canadian O&G Partners

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Well Site Location #1
Level Controller
Level Control Dump Valve
Chemical Injection Pump
Outlet Pressure Control
Inlet Pressure Control – Linear Actuator
Site Overview
Electrification Summary

- 4 x 130 Watt Solar Panels
- 10 x 100 amp batteries
- 1 x Inlet Pressure Control valve – Calscan BA-15L Linear Actuator
- 1 x Outlet Pressure Control valve – Calscan BA-10Q electric actuator
- 2 x Level Controllers (water and condy) - Fisher L2e
- 2 x Level Control valves (water and condy) – Calscan BA-3Q actuator
- 1 x Chemical injection pump – LCO Crossfire
- 3 x Level switches –
- 2 x Pressure switches –
- 1 x Existing RTU – FloBoss 107
SAFCell - Fuel Cell

- Fully solar electric sites may only have 3-4 days autonomy if solar fails
- Fuel cell provides backup/supplemental power
- Operates at mid-range temperatures (250°C) compared to existing suite of products
- 50 W unit being piloted at Repsol sites.
SAFCell Market Niche

Simple system with low cost components

Combustion generators

Hot' fuel cells

Fuel agnostic and highly efficient

Cold' fuel cells
Thermoelectric generators

Durable and rugged

SAFCell
SAFCell Operation

- To production
- Communications link
- Sensor
- Process power
- Electronic injection
- SCADA monitoring
- Fuel cell uses field grade methanol (uninhibited)

Christmas Tree Wellhead

Methanol tank

SAFCell RP-50-M generator
Key Learnings

• Electric level control valves perform far faster than originally anticipated

• Linear electric actuator:
  • versatile enough to fit existing control valve bodies
  • works very well
  • provides easy install

• Chemical pump had some high power draw issues initially – resolved

• Cabling and batteries are thief magnets – working on a solution

• Fuel cell was installed on November 23rd so data is limited.
  • It provides adequate power if the solar supply goes down but too early to tell
Lemonade Summary

• Likely to introduce electrical enhancements to our skid design for 2019 new drills (e.g., level controllers)

• Instrumentation team looking at converting the outlet valve to electric

• GHG crediting potential

• Skid design is much cleaner & simpler

• Potential construction time savings to be realized

• LEL exposure to personnel practically eliminated
Methane Reductions

Methane Reduction Project Example – Video (Note: minimum 720p and fast connection required)
Thank You!!