

Calscan Field Tour:

Zero Emission Greenfield Upgrade

Location: In the bush near Grande Prairie, Alberta
Minimum Sunlight: 2.2hrs/day



www.calscan.net
780-944-1377

"Keeping the Sky Blue"

Customer Requirements:

True Zero Emissions: Solar powered only, no CO₂ emitting Instrument Air System
Limit changes to current proven separator design
10+ Days of Power Reserve

Current separator designs are really a hybrid of electric and mechanical controls. An RTU monitors a variety of electrical sensors such as pressure, LEL, and flow transmitters. The outlet and inlet control valves typically use a current to pressure (I/P) converter to control methane powered pneumatic actuators. Oil and water dump valves and the separator level controllers are also methane powered and work together to control the separator's fluid level.

Modernize your separator to zero emissions in three steps: First audit your power system to get a handle on how much electrical power is currently being used. Second upgrade your methane controls to electric. Finally beef up your power system's solar & batteries if needed and make it fail safe.



Two fast acting Bear SA linear actuators used on Fisher D2 dump valves and on the right a BA-15L being used for outlet back pressure control

Power Audit

In the 10+ years of designing low power separator systems the one thing that Calscan has learned is not to trust the manufacture's power specifications. Every part should be measured to get an understanding of the systems current power needs. Additional solar panels or batteries can be added if necessary once the required power needs for the electric actuators are factored in.

In this system, an anomaly was found. The HMI drew over 300mA and had a low power mode that was assumed to be zero. When the low power mode was actually measured it was drawing over 210mA, this was equivalent to half a chemical pump of current. An HMI timer was added to the design to kill the power to the device after 30 minutes. The rest of the system seemed pretty normal.

At the end of this document is the completed Solar Power Budget that used the data from the Power Audit for your reference. A Power Audit is a service we offer and highly recommend to all our clients when modernizing their separator to achieve reliable zero emission.



A separator control panel undergoing a power audit. The bottom part of this cabinet is inserted in the separator building and holds eight AGM batteries.

Actuator Upgrade

Control Valves:

For inlet control on the separator a 3" BTE Forum Choke was used. To actuate it we installed the Bear LX series ¼ turn electric actuator. A CVS E-Body valve on the outlet control was mated with the Calscan BA-15L linear actuator. These field proven low power actuators, besides being zero emission, will improve the performance of your PID loop. With less friction and backlash in the drive linkage compared with pneumatic actuators, your PID loops will be less prone to oscillate at the setpoint. Hookup is easy as the actuators use the same 4/20mA controls lines that were used on the I/P converters. No PID code changes were necessary.

Level Control:

Level dump valves were outfitted with Calscan SA fast acting linear actuators. The SA series uses our SSR3 Actuator Controller with feedback. If the valve fails to reach fully open or fully closed position, a failure signal is sent to the RTU so it can detect an actuation failure.



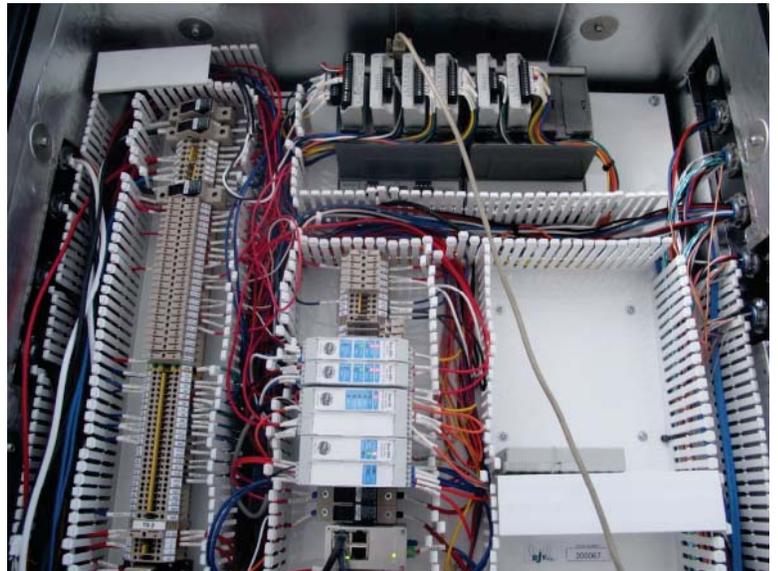
A 3 inch BTE Forum Choke outfitted with a Bear LA-7 Electric ¼ turn actuator and electric level controllers being installed

Power System Upgrade

In this application the client used an inserted RTU Panel and battery box attached to the outside wall. This allowed the batteries to take advantage of the heat from inside the building. As a result less batteries were needed, as they lose about half their capacity when the temperature drops from 0°C to -40°C.

After generating the Solar Power Budget we calculated there was enough battery capacity for a 10 day reserve but there was not enough solar capacity to keep it charged. An extra 160 watts of solar panels were added to ensure the system had enough current to keep the batteries charged in the winter.

In addition to protecting the separator from power and RTU failure, the Bear UPS and Fail Safe Controller (FSC) were installed. If an RTU failure or power outage occurs, the Bear FSC will automatically shut the gas well in, preventing an unsafe condition.



A FloBoss 107 being integrated with the Bear Failsafe System. The Bear FSC has a built in watchdog timer that can help detect an RTU failure, then independently shuts in the separator

Bear Benefits:

Environment:

- **ZERO EMISSION** for the life of the well
- Compliance with BC 2021 Regulations: OGC 286/2018 Section 52.05 - Pneumatic Devices
- Compliance with Alberta 2022 Regulations: AER Directive 60 Section 8.6.1 - Vent Gas Limits for Pneumatic Devices

Finance:

- Carbon credits available in Alberta until 2028 for new and old installations (green & brown field)

Operations:

- Safer operating conditions for field personnel by eliminating venting of dangerous well gases such as H₂S
- Eliminate maintenance issues with pneumatic instrumentation and actuators using wet/sour/dirty fuel gas
- Electric controls are much easier to remote monitor/control and collect data for future AI optimization

For Help Reducing Your
Wellsite Emissions Contact:



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"Keeping the Sky Blue"

Solar Power Budget Estimate

Customer: Super Green Energy Inc.

Location: Grande Prairie, Alberta

Prepared By



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System Voltage	24V				
Idle Current of Non-Calscan Electronics					% of Total
	amps	Qty	amps		
RTU	0.070	1	0.070		
HMI after retrofit	0.000	1	0.000		
Radio	0.100	1	0.100		
LEL	0.125	1	0.125		
Totalizer	0.008	2	0.016		
ESD Solenoid	0.060	1	0.060		
Solar Charge Controller	0.005	2	0.010		
4/20 Loops / Transmitters	0.020	6	0.120		
Sub-Total			0.501		40%
Chemical Pump Current - manufacturer's est.					
			amps		
40L/day @ 5000kPa = 7-10W (0.29-0.42A)			0.420		33%
Idle Current of Calscan Supplied Equipment					
	amps	Qty	amps		
Bear FSC + UPS + trickle	0.060	1	0.060		
Bear SVC (Voltage Converter)	0.020	0	0.000		
Bear SSR3	0.005	2	0.010		
BA-15L Actuator Idle	0.075	1	0.075		
Q-Turn w ith 4/20 Idle	0.040	1	0.040		
Sub-Total			0.185		15%
Control Valve Dynamic Current					
(due to movement)	amps	Qty	amps		
Duty Cycle (estimate)		5%			
BA-15L	1.000	1	0.050		
Q-Turn	1.000	1	0.050		
Sub-Total			0.100		8%
Dump Valve Dynamic Current					
(due to movement)	amps	Qty	amps		
Average Cycle Period (minutes)		3.0			
SA-L-Series (5sec)	1.000	3.0	0.000		
SA-SX-Series (5sec)	0.500	3.0	0.056		
Sub-Total			0.056		4%
Total Average Equipment Current:			1.262 A @ 24V		100%
Battery Calculation					Ah (@12V)
No-Sun Reserve (days)		10 days			
Battery Required @ 20C				606	
Battery Required @ 0C (Inserted Battery Box)				709 Ah @ 12V	
Battery Required @ -40C (Battery Box Outside)				1538 Ah @ 12V	
Solar Calculation, for location:					Grande Prairie, Alberta
December Sun (MJ / m ² / day)		8 MJ =	2.2 hr/day		
Solar Panel Voltage		19.2 V			
Charging efficiency		80%			
Solar Power Required			661 W		