Success With the Solar Methanol and glycol pumps
Moxa Geographic Location
Granger, Wyoming
Solar Methanol pump
Moxa’s severe winter
Challenge:

• Eliminate hydrates in the production string while producing.
• Pump down time contributes to the build up of hydrates.
• Hydrates cause production downtime and unsafe operations
• Some times hydrates are mistaken as liquid loading, causing operators to use incorrect operating procedures, which can cause a hazardous situation
• **Reduce Green House Gas emissions**
• Minimize methanol spills
• Lower Methanol consumption
The Hazards of Hydrates!!!
Pre-solar

• In the past we used two different styles of pumps: Western and Texteam
• These pumps would use an average of 6-8 gallons of methanol a day
• Working off a gas supply from the separator, they would also vent to the atmosphere.
Fuel line distance from separator to pumps

Western methanol pump

Texteam methanol pump
Solar Pump Advantages

• More reliable than diaphragm pumps.
• Reduce methanol usage to an average of 2.5 gallons per day
• Sell vs. vent gas
Solar Pump Advantages Cont.

- Fuel Gas savings.
- Less refilling of the methanol tank will reduce the chance of a spill incident.
- A more reliable pump means less downtime on production.
This well had a Texsteam Pump with a rate of 6 gals/day, until Solar Pump installed 11/06/2004 with a rate of 2 1/2 gals/day of Methanol.

Operator ran out of Methanol

Plunger install 11/13/2003
Solar pump 11/06/2004
From 8/2003 this well had a Texsteam pump with a rate of 8 gls/day, until 12/14/2004 when the solar pump was installed at a rate of 2.5 gls/day.
Economics

- 160 solar pumps cost $500,000.
- Methanol savings pay out is 1.3 years.
- Texsteam & Western rate of 6-8 gal/day.
- $1.5 gal x 160 pumps x 7 gal/day = $613,200 / year.
- Solar pump rate of 2.5 gal/day.
- $1.5 gal X 160 pumps x 2.5 gal/day = $219,000 / year.
- Methanol savings of $395,000 / year.
- 4 wells down at 300 mcfd for 6 months = $1.3 M.

- **Solar pumps pay out in less than 3 months in winter conditions.**
End Results

• The use of solar pumps keep production loss and hydrates to a minimum.
• Fine tune methanol usage.
• Less methanol usage 8 gal/day to an avg. of 2.5 gal/day.
• Elimination of fuel lines and freezing problems during winter times. (6-8 months of the year)
• **No Emissions**
• Less maintenance
• All this it will help us to have a safer and better environment operations
Solar Glycol Pump
Solar Gycol Pump Tests

• Currently use heated GW for heat trace at well facilities.
• Fuel gas consumption is 4-13 mcf/d for each diaphragm pump (based on pump curves). Some wellsites have two pumps.
• Target FG savings about 1.2 mmscf/d -- 80% of the 430+ wells @ 8 months/yr run time.
First test

• System composed of solar panel, batteries, 24V to 120 Vac inverter, ½ hp motor and gear pump. Pumping about 3-4 gpm.
• Efficiency is poor taking over 1.2 electrical hp to generate .042 hhp—3.5% total efficiency.
• Three shut-downs due to low voltage from Dec. 06 through July 07,
• Kept the well from freezing except for a few days during -41F weather in Jan (4gpm)
• Illustrated the need for more efficient pump/motor
Test two

• Using 24 V 1/5 hp brushless DC motor:
  • Eliminates cost of inverter and energy conversion loss
  • No high voltage safety concerns
  • Higher efficiency motor
• On line Feb ’07, but several shut down’s, reason unknown
• Test run: 0.39 hp to generate .054 hhp, 14% total efficiency, 400% improvement
Second System
Final (?) version

• Using 24 V 1/2 hp brushless DC motor, close coupled gear pump:
  – 680 W solar generator
  – 800 A-hr battery
  – 5.5 gpm, 25 psig discharge, 5.5 amps
• 4 month run time, no problems
• Electrical to hydraulic power conversion efficiency >35%, up from 3.4% on the first system.
• Currently concentrating efforts to improve heat transfer,