Flare Gas Recovery in the Bakken

Loy Sneary
Bernard Groce
Satish Ravindran
EFD Program
A collaborative effort
Industry – Academia - Government
Environmental Organizations

Providing unbiased science to identify, develop and transfer critical, cost effective technologies for safe and environmentally friendly drilling.
EFD Program
A collaborative effort
Industry – Academia - Government
Environmental Organizations

Providing unbiased science to identify, develop and transfer critical, cost effective technologies for safe and environmentally friendly developments.
EFD-Objectives

• Address environmental and societal issues in oil and gas operations
• Reduce footprint of operations in environmentally sensitive ecosystems

“No other organization in the oil and gas area has ever been able to successfully link this broad spectrum of stakeholders, providing opportunities for communication between groups that normally do not communicate very well “ -- RigZone
EFD Projects

Core
• EFD Scorecard
• EFD- TIP program
• Coastal Impacts Technology Program
• Environment 24/7

Supplemental
• Powered by Natural Gas (PBNG)
• Flaring Issues, Solutions and Technologies
• Dopefree Pipe
• FracFocus Webinar Training
EFD- Technology Integration Program

- Speed the commercial development of technology developed through RPSEA programs
- Create an organizational structure to build a network of regional centers to facilitate deployment of cost effective solutions
- Perform **field trials** and evaluate results
- Document case studies and enhance sustainability
Focuses on field trials, documenting and reporting.
Demonstrate ability of the equipment to produce electricity from flare

Demonstrate that electricity production does not interfere with well operations

Determine emissions offset and prove technology works
Oil and Gas Flare Reduction Field Trial
Cost Effective Methane and VOC Reduction
Low Temperature Waste Heat to Power

THIS IS SMART POWER®
Organic Rankine Cycle = Waste Heat to Power

- Recover heat from hot water flow to boil working fluid
- Use pressure of expanded working fluid to spin a drive shaft connected to a generator
GCGE Commissions First Post R&D Green Machine
SMU
6.18.08
GCGE
Makes Emission Free Electricity

Solar Thermal

Internal Combustion Engines

Compressed Gas Cooling

Co-produced Water

Flare Gas to Power
GCGE 1st to Make Power From Produced Water

Denbury Resources Oil Well, Mississippi
Engine Installation in Oil & Gas
Available Models

Power+ 4200
Up to 35kW

Power+ 4400
Up to 65kW

Power+ 6500
Up to 110kW

Range of need:
- 15 - 110kWe output
- Up to 250°F
- Plug & Play
- Robust & Reliable
BEFORE THE INDUSTRIAL COMMISSION
OF THE STATE OF NORTH DAKOTA

CASE NO. 22058
(CONTINUED)
ORDER NO. 24665

IN THE MATTER OF A HEARING CALLED ON
A MOTION OF THE COMMISSION TO
CONSIDER AMENDING THE CURRENT
BAKKEN, BAKKEN/THREE FORKS, AND/OR
THREE FORKS POOL FIELD RULES TO
RESTRICT OIL PRODUCTION AND/OR
IMPOSE SUCH PROVISIONS AS DEEMED
APPROPRIATE TO REDUCE THE AMOUNT
OF FLARED GAS.

ORDER OF THE COMMISSION

THE COMMISSION FINDS:

(1) This cause originally came on for hearing at 9:00 a.m. on the 22nd day of April, 2014.

(2) The North Dakota Industrial Commission (Commission) Order No. 24392, signed May 14, 2014 continued the decision in this matter for an additional ninety days.

(3) This hearing was called on a motion of the Commission to consider amending the current Bakken, Bakken/Three Forks, and/or Three Forks Pool field rules to restrict oil production and/or impose such provisions as deemed appropriate to reduce the amount of flared gas.

This special hearing was scheduled to address the Commission’s newly-adopted policy on reducing gas flaring. The policy goals were to reduce the flared volume of gas, reduce the number of wells flaring, and reduce the duration of flaring from wells.

Action items to reach the policy goals included requiring Gas Capture Plans for increased density, temporary spacing, and proper spacing cases; requiring Gas Capture Plans for all applications for a permit to drill; schedule semi-annual meetings with midstream gas gathering companies to gauge the effect of Gas Capture Plans, production curtailments, contracts, and service interruptions; dedicate information technology resources to develop a web-based pipeline incident report form to better assess right-of-way issues; direct the Pipeline Authority to track flaring on/off the Fort Berthold Indian Reservation and report capture status versus goals; and direct this hearing to review and revise Bakken, Bakken/Three Forks, and/or Three Forks Pool rules governing production curtailment.
The Challenge

Fuel Overload
In North Dakota, the hunt for more oil has produced surplus gas. Natural gas is burned off, or ‘flared,’ where there are no—or overloaded—pipelines.

Number of producing wells in North Dakota

Monthly flaring ratios in N.D

Source: North Dakota Industrial Commission

The Wall Street Journal
Our Solution:
Eliminate flare, make power for well Opps.

Gas to Boiler

kW Output

Reduced Flaring
The Solution:
Gas Fired Low Emission Boiler + ORC
ElectraTherm Power+ ORC on Test Cell
Other Solutions: Reciprocating Engines

Produce More Power & Reduce Cooling Fan Load

Waste heat from engine jacket water or combination exhaust & jacket water
Radiator with a Payback

- **Avoid** Radiator Expense on a Greenfield Project
- **Offset** ORC Capex by 20-30%
- **Decouple Engine from Cooling**
  
  Net Shaft H.P. to Engine = 5-6%

- **Value of kWe:**
  Instead of using power from the
Key Takeaways

What are the benefits of eliminating a flare?

- Flare is not burning
- Reduced emissions
- Compliance with state and Fed flaring requirements
- Methane optimization
- Renewable energy = potential incentives
- Added efficiency when Reciprocating engines used
For more information please contact:

Loy Sneary, President/CEO
Gulf Coast Green Energy
1801 7th Street, Suite 230
Bay City, Texas 77414
loy.gcge@gmail.com
Direct: 979.240.3512
www.gulfcoastgreenenergy.com