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What do we do?

Allows gas that would otherwise be vented or flared to be recovered and sold.

Reduces likelihood of vent emissions and eliminates routine flaring resulting in significantly improved environmental footprint.
Zero Pad Emissions with Higher Cash Flow

- Catalytic reactor removing $O_2$ from hydrocarbon vapor streams
- Patented technology
- Proven – over 200 upstream installations
  - Permian
  - Rockies
  - Marcellus-Utica
  - Mid-Continent
- Economic returns typically 3x - 5x investment
- Substantial reduction in site emissions (VOC, NOx, CO, GHG)
Applications

- Recovery of entire flash vapor stream at upstream storage facilities
- Prevent shut-in due to $O_2$ pipeline specs
- Gas gathering facilities for $O_2$ & corrosion control
- Substantially reduced flaring
- Air compliance: prevents vent emissions through direct control of tank pressure
ZerO₂ Operation

- No moving parts
- Gas pre-heated using fully welded SS plate exchanger
- Flow is upwards through heating element then down through catalyst bed
- O₂ converted to ~ 2/3 water and 1/3 CO₂
- Immersion heater maintains gas at reaction temperatures
- O₂ analyzers to monitor performance
- Radio and/or Scada transmission of operating data at all times
24 Hour Performance

- Exothermic reaction removes up to 50,000 ppm O\textsubscript{2} at the inlet.
  - More oxygen -> higher outlet temp.
- Outlet O\textsubscript{2} concentrations typically lowered to < 2 ppm.
- Blue = reactor inlet temperature
- Pink = reactor outlet temperature
- Orange = inlet O\textsubscript{2} ppm
- Red = outlet O\textsubscript{2} ppm
How Does ZerO₂ Generate Value?

- No VRT
- More, richer gas to sell
- Lower compliance risk & cost
- No sales shut-in
- Improved safety
- Increased oil sales
- More wells per pad?
- Lower PTE
- Stakeholders?

EcoVapor Value Example

Year 1 Value

- 3 Well Pad with 650bpd per well - API 50, $50/bbl price
- 1.5 MMSCFD assoc. gas, $2.70/mcf price
- 207 mscfd flash vapor (GOR Method 50 API/40 Psig drop)
- 50% Btu premium for vapor
- 80% VRT efficiency
- 1% increase in oil from ZerO₂
- Pad: VRT + VRU + Tanks + 2 Combustors + 1 Utility Flare
- Solution: No VRT + Tanks + ZerO₂ + 1 Dual Inlet Flare

More wells per pad - ↓ Capex $$
Lower PTE - ↓ Regulatory $$
Reduced Flaring - Stakeholders
Significant Reduction in Air Emissions

- Entire flash vapor stream recovered
- Routine flaring no longer required

Key Assumptions

- VRT efficiency of 75%
  - Leftover gas is flared
- Flare VOC destruction 98%
- Vapor recovery system uptime 95%
- Emission factors from AP 42, sec. 13
- GHG not shown but Ecovapor case reduces GHG by 95% from flaring and 80% compared to conventional VRT recovery
Oil Major – West Texas Site

- 2 MMscfd flash vapor sales
- Approx. $330k/month additional sales revenue
- VOC reduction vs flare – 670 TPY
- NOx reduction vs flare – 65 TPY
Ecovapor Recovery Systems

Who We Are
- Denver-based privately held company - 20 employees currently
- Significant vapor recovery design engineering & operations expertise
- Continuing engineering on new models and gas treating solutions
- Field service in major regions

Why We are at URTec
- Technology is proven and operating
- Adoption of new technology is challenging
- Market awareness is a priority given the thousands of energy operators
- We believe there are applications we haven’t yet considered
- Always want feedback
Responsible Energy Development

www.ecovaporrs.com