



ECOVAPOR ZERO<sub>2</sub>

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# Ecovapor ZerO2 Technology

**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<sub>2</sub> 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)

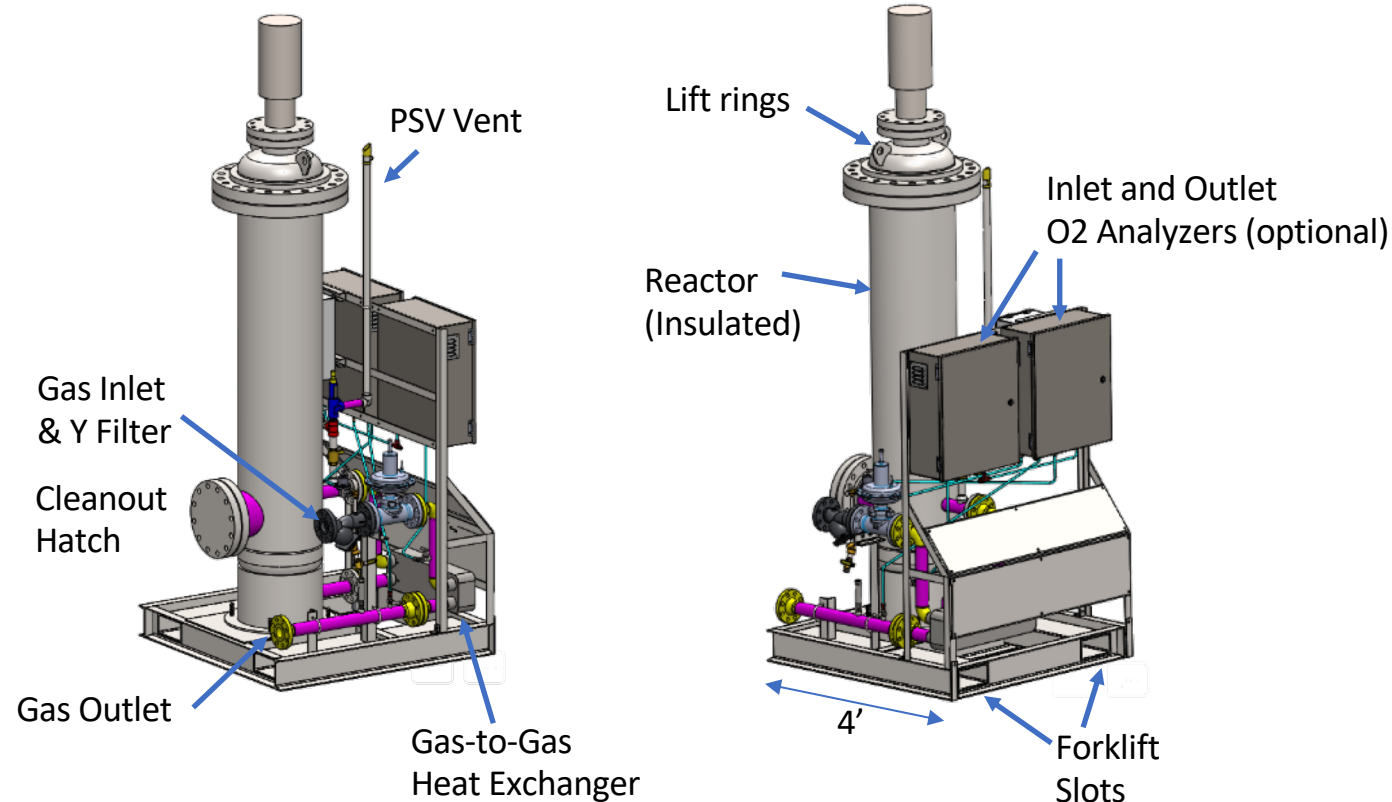
# Applications



- ✓ Recovery of entire flash vapor stream at upstream storage facilities
- ✓ Prevent shut-in due to O<sub>2</sub> pipeline specs
- ✓ Gas gathering facilities for O<sub>2</sub> & corrosion control
- ✓ Substantially reduced flaring
- ✓ Air compliance: prevents vent emissions through direct control of tank pressure

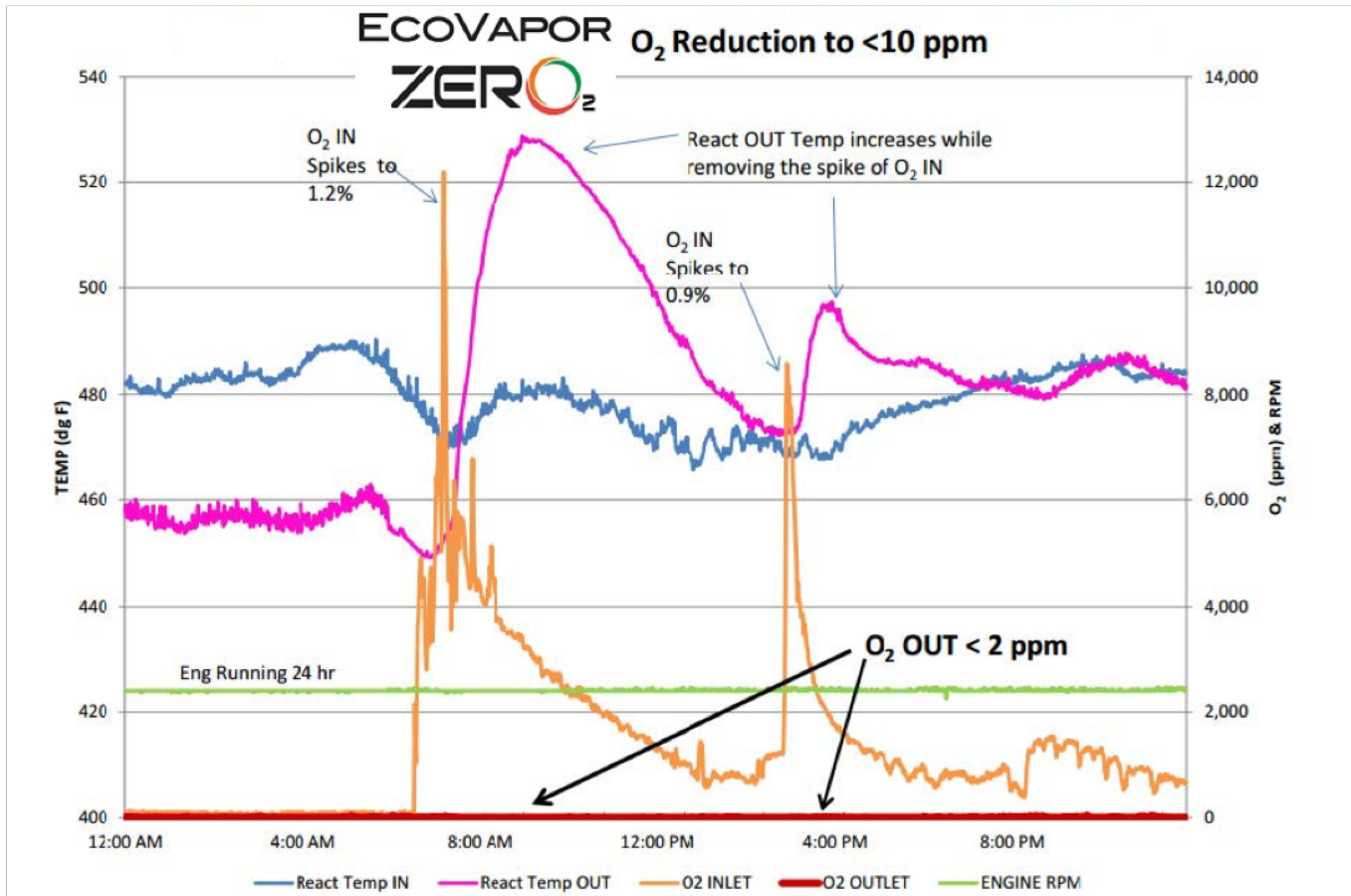
# ZerO<sub>2</sub> Operation

**Two models: 300 and 1200 MSCFD**



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

# 24 Hour Performance



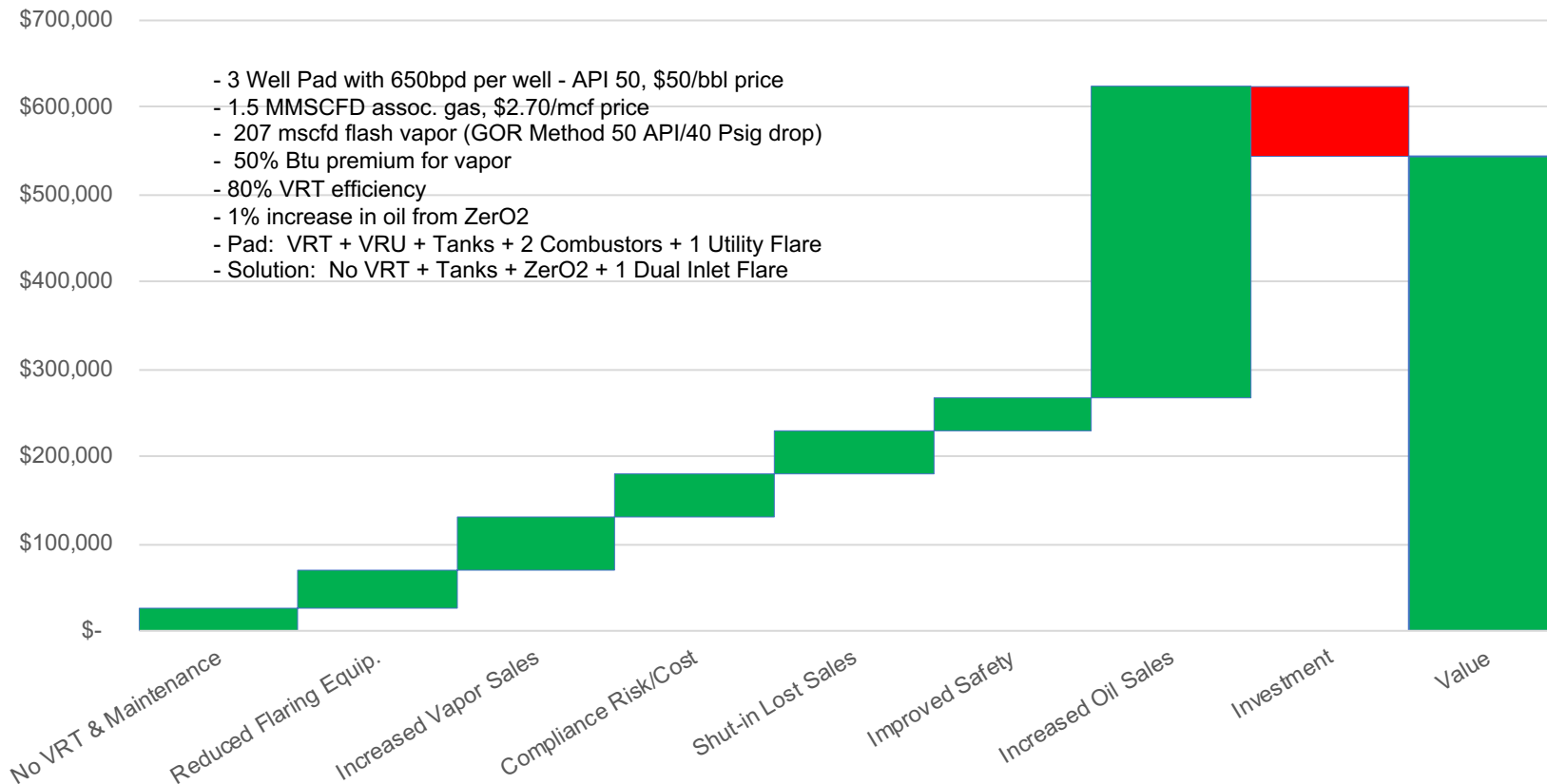
- Exothermic reaction removes up to 50,000 ppm  $O_2$  at the inlet.
  - More oxygen -> higher outlet temp.
- Outlet  $O_2$  concentrations typically lowered to < 2 ppm.
- **Blue** = reactor inlet temperature
- **Pink** = reactor outlet temperature
- **Orange** = inlet  $O_2$  ppm
- **Red** = outlet  $O_2$  ppm



# How Does ZerO<sub>2</sub> Generate Value?

## EcoVapor Value Example Year 1 Value

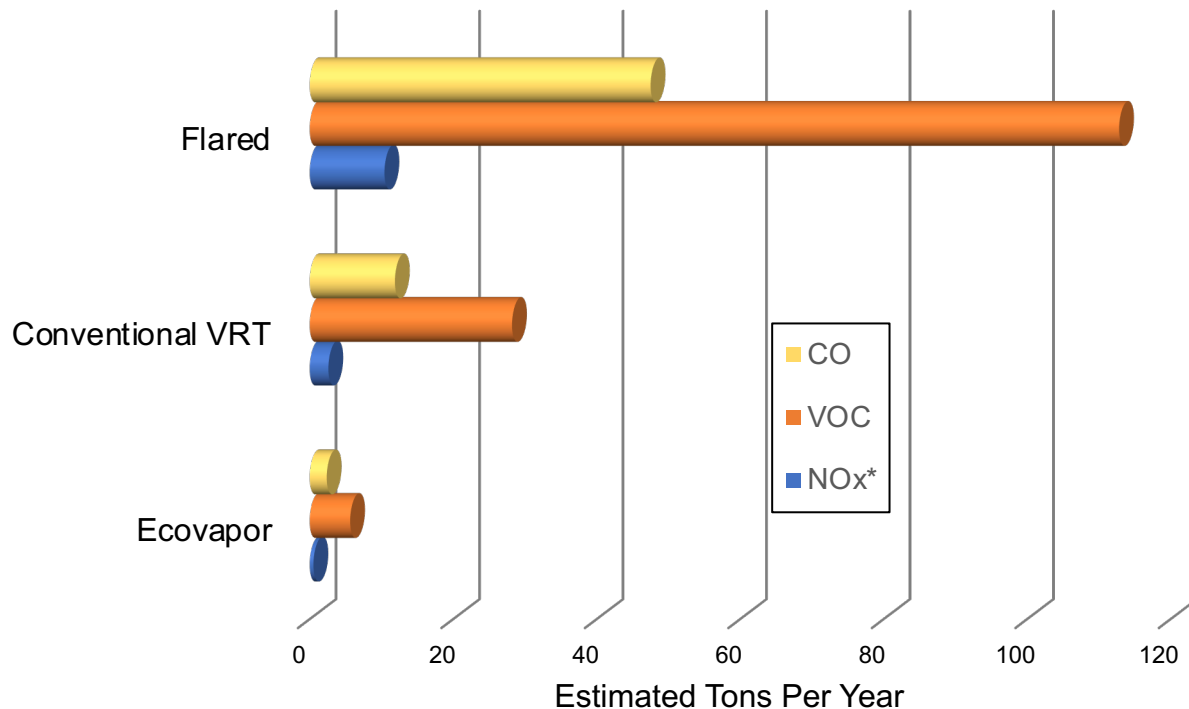
More wells per pad - ↓ Capex \$\$  
Lower PTE - ↓ Regulatory \$\$  
Reduced Flaring - Stakeholders



- 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?

# Significant Reduction in Air Emissions

Estimated Emissions under Three Control Methods  
300 mscfd of 46 Mol Wt Vapor



- **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



# Proven Technology / Demonstrated Benefits



## 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](http://www.ecovaporrs.com)***