

Using Associated Gas as a Clean Power Source for Oil & Gas Operations

Ener-Core manufactures power generation products which enable oil & gas operations to cleanly generate power from gases that previously were wasted or had no economically viable use. Ener-Core's systems leverage an anticipated worldwide trend towards decreasing waste and increasing associated/process gas utilization. Ener-Core Powerstations utilize a greater range of gas including low-quality gas for:

- Avoiding flaring and venting
- Transforming a source of unwanted emissions and pollution into onsite power
- Complementing current processes by converting difficult to destroy gases into low emissions electricity

Ener-Core's Solution to Convert Air Pollution into Clean Power

Ener-Core's Gradual Oxidation technology can effectively convert impure gases including low energy density ones into a form which can be processed by gas turbines to produce electricity and heat.

We believe that our customers can greatly reduce the cost of compliance with air quality regulations by avoiding the chemicals, catalysts, and complex permitting required by competing systems. Our products are specifically engineered for fuel flexibility and modularity, so that low-quality fuels and off-specification gases can be used as an energy resource instead of being a waste and emissions source from venting and flaring.

Technology

Gradual Oxidation works by replacing a combustion reaction with a chemically similar, but slower chemical oxidation reaction which occurs at lower temperatures than combustion. Our technology extends a historical trend in engine technology seeking to improve emissions and expand the fuel operating range. Our systems are designed to allow for the extraction of energy from previously unusable fuels, reduce harmful pollutants, and create useful energy products such as heat and electricity. We have completed a number of development and deployment milestones in the last five years. In 2012, our technology successfully underwent testing and verification completed by an independent third party as part of U.S. Department of Defense ("DoD") demonstration program.

Associated Gas Utilization Benefits of an Ener-Core Powerstation

- Unprecedented capability to use weaker fuels like waste gas from oil and gas operations
- No need for chemicals or catalysts
- Minimal contaminant removal required
- Tolerant of H₂S, CO₂ and changes to gas composition while operating
- Achieve low emissions (Less than 1ppm NO_x is achievable)
- Capability of generating electricity from a wide range of associated gases, from high CO₂ low energy gases to high energy heavier hydrocarbon gases from operations.
 - Standard gas turbines used for 250 kW and 1850 kW modular systems



TURN POLLUTION INTO A RESOURCE THAT PAYS FOR ITSELF

ENER-CORE

Is your operation ideal for an Ener-Core Powerstation? *It may be if it has several of the following...*

- ☑ **Low Quality Gas:**
 - **Low Energy Density Gas (Low Calorific Value)**
 - Associated gas from oil recovery operations may be too low in energy density (below 300 Btu/scf) to use in reciprocating engines or gas turbines. Disposing of this gas without disruption to the site operations may be difficult, especially if venting and/or flaring are restricted.
 - **Tail Gas from Processing Plants or Pipeline Gas Conditioning**
 - Tail gas is usually below 20% methane, often requiring supplemental fuel to be flared.
 - **High CO₂ Associated Gas**
 - Some fields or processing plants have a gas stream which has a high “inert” content. This high percentage of CO₂ (greater than 40% by volume) may limit the choices to venting or flaring since reciprocating engines may have difficulties running on this type of gas..

- ☑ **Heavier Hydrocarbon Gas.** Depending on the field and operations, higher than pipeline specification gas may be collected. This higher than specification gas can cause knocking in reciprocating engines and acoustic waves in gas turbines if used for power generation. The choices then might be limited to venting or flaring.

- ☑ **Emissions Concerns or Emissions in Non-attainment.** The site may need to reduce existing air pollution, such as high oxides of nitrogen (which leads to ozone) and carbon monoxide emission levels, to avoid fines, operations restrictions or shutdown within a non-attainment region.

- ☑ **Tank Farm or Gas Collection with Continuous Supply of Gas.** Flares are currently in place, and gas is being flared or vented continuously.

- ☑ **Demand for Onsite Power or Supply Concerns from Utility Grid.** If there are onsite energy needs or are concerns about supply from the grid, then retail electricity prices can be offset with low value gas.

Products



FP250

250 kW Product: The Ener-Core Powerstation FP250 combines Gradual Oxidization with a 250 kW gas turbine, developed by Ingersoll-Rand plc. and FlexEnergy, Inc. Ener-Core's Gradual Oxidizer replaces the turbine's standard combustor, resulting in a generation system with a wide fuel operating range and ultra-low emissions.



KG2-3GO

2 MW Product: Our next product, the Ener-Core Powerstation KG2-3GO, combines our Gradual Oxidizer technology with a two megawatt gas turbine, developed by Dresser-Rand Group Inc. Ener-Core is accepting orders for this unit now.