

2012 Technology Showcase Company Presenters

Descriptions of Technologies

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Advanced Tec Materials, LLC (ATM) (www.advancedtecmaterials.com) is dedicated to the research, development and commercialization of green material technologies, primarily through the conversion of coal combustion byproducts into environmentally sound formulations with advanced performance characteristics. **ATM has developed a patent pending, modified polyurethane foam that can be used to encapsulate underground pipelines and reinforce anchoring structures.** ATM's foam sets rapidly, bonds solidly within 60 seconds (which significantly reduces material and labor costs), and resists temperatures of ~750°F. ATM foams have been field tested as grout material for permanent installations replacing concrete for pier installations. Independent laboratory tests showed a maximum strain resistance of over 6,500 pounds.

Altela, Inc. (www.altelainc.com) is addressing the E&P industry's water recycling needs through its proprietary, patented **AltelaRain® thermal distillation process that utilizes a revolutionary new technology that purifies water without the need for energy intensive equipment, high temperatures, expensive membranes, or high pressures required by other technologies.** Altela can treat a minimum of three gallons of contaminated water for the heat energy usually required to treat only one gallon by conventional thermal distillation. Commercial installations have been successfully completed in the Marcellus Shale, Piceance Basin, San Juan Basin, and in Alberta, Canada. The technology has been tested and approved by the USDOE, USEPA, and other governmental agencies.

ARCADIS US, Inc. (www.arcadis-us.com) has developed a **mobile emissions measurement and leak detection unit that consists of a rapid-response methane analyzer, GPS, and meteorological instrumentation for installation in a field vehicle.** Air samples are collected from a vehicle-mounted measurement mast and real-time data logged to a control computer. Custom-designed software displays real-time methane concentrations, vehicle position, and meteorological conditions. The software is also used to map methane concentrations along the measurement path, which allows the user to quickly identify emitting sites. After an emitting site is identified, additional monitoring can quantify the methane emission rate from the site in real-time.

Capstone Turbine Corporation® (www.capstoneturbine.com) is the world's leading producer of low-emission, microturbine systems, and was first to market with commercially viable air bearing turbine technology. Capstone **has developed the Clean Cycle 125 (CC125), an organic rankine cycle (ORC) system, that can produce up to 125 kWe gross at 380-480V, 3 phase, 3 wire, 50/60hz.** The CC125 can produce power from many different heat sources, such as reciprocating engines, heaters and boilers, with a minimum of 177°C (350°F) and a heat flow of 3.04 MMBTU (890 kW). The heat source must be higher than this amount to account for heat transfer process losses (waste heat to CC125 working fluid).

Eagle One Green Solutions, LLC (www.goeagleone.com) has developed a **treatment for recycling hydraulic fracturing waters using ferrate (Fe6+).** In a single dose, Fe6+ can simultaneously perform as an oxidant, coagulant, anti-foulant, disinfectant, and deodorant; and it reduces the formation of scale-causing metals, and removes compounds imparting color. Fe6+ has been used to achieve a total kill of sulfate reducing bacteria and acid producing bacteria in flowback waters, and significantly reduced soluble barium, calcium, iron, manganese, phosphorous, silicon and strontium in production waters. Flowback and produced waters treated with Fe6+ can be wholly recycled and reused for well site-completion operations.

Epiphany Solar Water Systems (www.epiphanysws.com) is applying a two-stage process with

PMC BioTec to process shale gas well frac water onsite and create renewable products with virtually no residuals. Stage 1 uses PMC BioTec's biological conversion technology to destroy organics and recover heavy metals minerals/chemicals from the frac water, leaving clean brine. Stage 2 uses concentrated solar power to flash distill the brine into distilled water and salt – both of which can be reused or repurposed. They expect that 1 gallon of frac water will yield approximately .70 gallons of water, 1.7-2.0 lbs of salt, and 1-2 oz. of solid waste. This process will dramatically reduce the number of waste water hauling trucks required, as well as truck traffic and its resultant damage.

Greenways Service, Inc. is developing a proprietary filtration system to treat shale wastewater. Greenways' filter membranes are sustainable and reusable; they utilize powdered metal for many scales of filtration - from micro, ultra, to nanofiltration - and minimize waste throughout not only the filtration process but also during the construction of the filter system. Using the Greenways' process, total suspended and dissolved solids, and heavy metals will be reduced. The Greenways process produces reusable water with reduced scale-building potential, measured using the Langelier Saturation Index, while also preventing corrosion. Treated water can be reused, as can salts captured through the filtration process.

HydroConfidence (<http://hydroconfidence.com>) has developed a groundwater and casing monitoring system that can detect well pad methane migration as well as monitor the freshwater casing and caprock for mechanical integrity using microseismic sensors. HydroMonitor provides continuous, independent monitoring of aqueous methane and well mechanical integrity to identify and fingerprint potential contamination at natural gas production sites. The system can detect methane leakage or a failure in a well's integrity in real-time, allowing well owners to address a contamination source before it causes a public health hazard and before it affects well productivity; conversely, it can be used to disprove false claims of contamination. A not-for profit entity, CTC, will operate a 24/7 Response Center to monitor these networks. HydroMonitor can augment existing microseismic installations, be installed with a new microseismic system, or be deployed independently with its own seismic sensors.

Osorb® is a silica-based, swellable glass produced by ABS Materials that is capable of removing water soluble organics and volatile organic compounds from water. Produced Water

Absorbents (www.pwabsorbents.com) **utilizes Osorb's ability to capture up to 99% of dissolved and dispersed nonpolar organics for oil and natural gas applications.** Reusable and hydrophobic, it can repeatedly and reversibly absorb up to 25% of its own mass in dissolved hydrocarbons. An automated mobile pilot system has been developed to remove dissolved organics at rates up to 2160 bpd. A skid-mounted cartridge system that treats up to 1440 bpd is also available.

Pepro, LLC (www.peprollc.com) has developed their Pan & Tilt 300 Directional Antenna Mount (PT-300) that provides speed, precision and reliability for positioning antennas used for wireless communications and backhaul. Adjustments are quickly made from the ground with a manual or wireless handheld controller. The PT-300 provides fine adjustments without drift, eliminating the need for tedious offset manual shaft adjustments at the antenna. It has a pan range of 60 degrees, a tilt range of 10 degrees, and can withstand 120 mph wind speeds and other extreme weather conditions.

TM Filtration (www.tmfiltration.com) has developed their patented GFC series coalescing filter which removes solid contaminants and separates liquids from natural gas streams. Conventional coalescing filter element flow is from inside the element to outside. In TM's coalescing filter the gas flows from outside the filter element to inside which provides several functional and economic benefits over conventional coalescing element design. Additionally TM's elements can be ultrasonically cleaned and reused thus reducing cost and waste. Most importantly re-entrainment of contaminants into the downstream cleaned gas is not possible due to removed liquids not being in contact with outlet nozzle.

US Seismic Systems Inc. has developed ultrasensitive fiber optic sensor systems to detect the microseismic fractures occurring during the hydraulic fracturing process. USSI's sensors are powered only by light, with no downhole electronics, copper conductors, or electrical power, and are much more sensitive and have a lower noise floor than the current copper wire-based sensor technology. USSI believes that its new fiber optic technology, which provides substantially higher performance at an 80-90% cost reduction as compared to the legacy systems, will enable operators to cost-effectively monitor 100% of their frac jobs, leading to reduced environmental impact as well as improvements in extraction efficiency.

New Logic Research, Inc. (www.vsep.com) has developed a proprietary membrane filtration system, the Vibratory Shear Enhanced Process (VSEP). Their flowback water treatment strategy is to produce a reusable water that when blended with fresh water to frac another well, will have a low Langelier Saturation Index indicating minimum potential for scaling in the well and formation. VSEP produces a clear water permeate (about 95+% recovery) laden with disassociated salts. This concentrate contains about 35% total solids – suspended solids, colloids, organic materials, and some salts – of which about 30% is volatile. The concentrate can be thickened and conditioned for landfill disposal as a residual waste, and the disassociated salts returned to the well.