

PROGRAM facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Gas Exploration,
Production, and Storage

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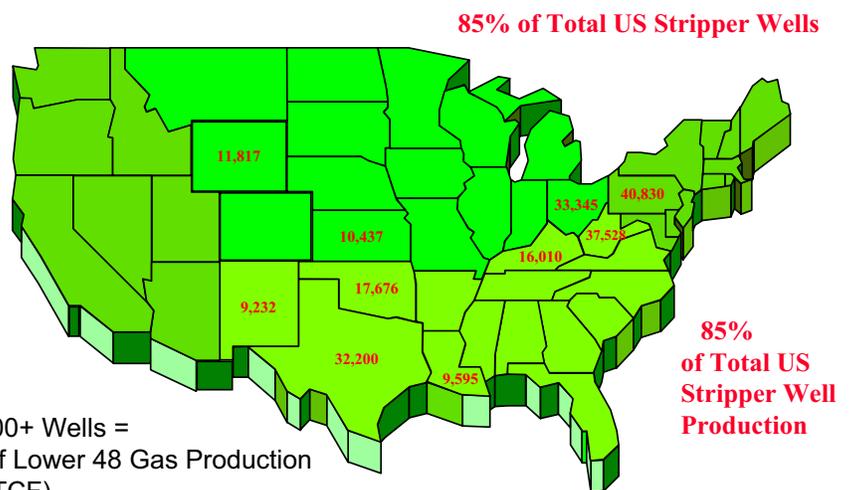
STRATEGIC CENTER FOR NATURAL GAS WEBSITE

www.netl.doe.gov/scng



STRIPPER WELL TECHNOLOGIES

The term "stripper well" is used to describe wells that produce gas or oil at very low rates (less than 60 thousand cubic feet (mcf) of gas per day or less than 10 barrels of oil per day). Through normal reservoir depletion over time, all producing gas wells will eventually become stripper wells. Operating and maintenance cost coupled with low producing rates often persuade operators to plug and abandon the wells prematurely. Once this is done, those resources are typically lost forever. Stripper wells are important to the energy security of the U.S., representing 10% of the natural gas produced onshore in the lower 48 states. They are even more critical in meeting near-term increases in gas demand as the increased production from stripper gas wells accounted for 43% of the overall rise in domestic production between 2001 and 2002. In 2002, the number of stripper gas wells grew for the eighth consecutive year to nearly 246,000. The majority of these wells are owned and operated by small independent companies, who operate on very small marginal budgets. To aid these operators in the development of low cost technologies to keep the stripper wells producing, DOE funds the Stripper Well Consortium (SWC) in an agreement with The Pennsylvania State University. The SWC is a national, industry-driven consortium focused on developing low cost technologies for both natural gas and oil stripper wells. The SWC has funded 39 projects since 2001, with resulting products now being offered commercially. The research funded focuses on three areas: reservoir remediation, wellbore clean-up, and surface system optimization. For more information on the SWC and the technologies being developed, visit the SWC website at www.energy.psu.edu/swc.



245,000+ Wells =
10% of Lower 48 Gas Production
(1.42 TCF)

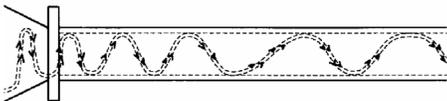
Top Ten Stripper Gas Well States

SWC Projects



GOAL PetroPump

Gas Operated Automatic Lift (GOAL) PetroPump – Brandywine Energy & Development Co. has developed a gas operated automatic lift plunger lift tool to remove fluids from stripper wells. The system is unique in that it operates automatically using an on-tool pressure activated valve pre set to retrieve and deliver a fixed volume of fluid each run and then to automatically return to the well bore for additional fluid when required. The tool has low maintenance and service requirements, which is generally limited to changing the cup seals after several months of operation. It is inexpensive to operate as it requires no external energy source and limited manpower.



Vortex Flow

Vortex Flow Tool – Vortex Flow, LLC has developed a revolutionary flow development chamber that takes a disorganized single or multiphase flow and transforms it to a spiral flow. The vortex created by this reduces the friction that causes pressure drops as fluids flow through a pipe. Test results have shown that the tool eliminates water build-up in low spots in flow and gas gathering lines, therefore eliminating line blockages. The tool has been tested in gas gathering lines, production flow lines and in a downhole application.

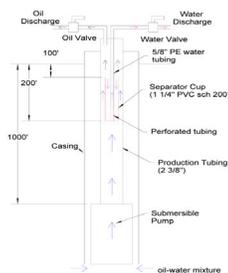


Hydraulic Diaphragm ESP

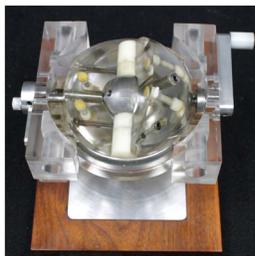
Hydraulic Diaphragm Electric Submersible Pump – Pumping Solutions, Inc. (now part of Smith Lift, LLC) has developed a new type of pump based on a hydraulic driven diaphragm, which has proven to be very tolerant of debris, and allows placement of the pump inlet below the perforations in sandy wells. Its performance advantages include the following: pumps solids, pumps gas/liquid mixtures, pumps dry/off with no damage, pumps any viscosity (high or low), has constant output with depth, is efficient at low volumes, and is highly efficient with reduced electric costs. This pump is now being offered commercially by Smith Lift.



Low Cost Separator



Low Cost Oil/Water Downhole Separator – Pumping Solutions, Inc. (now part of Smith Lift, LLC) has developed a novel, low cost gravity separator that is used in conjunction with submersible pumps. The patented gravity separator technology uses the volume inside the production tubing as the separator, and is most useful at lower flow rates (< 100 BPD). The separator has the potential to replace more expensive, less environmentally friendly, surface separators commonly used today. The cost of the separator, not including the pump, cable, and standard tubing is less than \$50.



Weatherbee Pump

Weatherbee Pump – W&W Vacuum & Compressors, Inc. is developing a novel type of variable capacity compressor for low productivity gas production operations. The new compressor has 4 rotating chambers, which provides 4 intake and 4 exhaust strokes in each 360 degree rotation. The pump has no wasted motion as two chambers are loading while two chambers are unloading. All of the pump volume is swept as there are no corners or “dead places” for fluid or pressure to get trapped. Due to the innovativeness of the pump, the medical industry is also interested in this technology for ailing hearts.