

PROGRAM facts

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

Strategic Center
for Natural Gas & Oil

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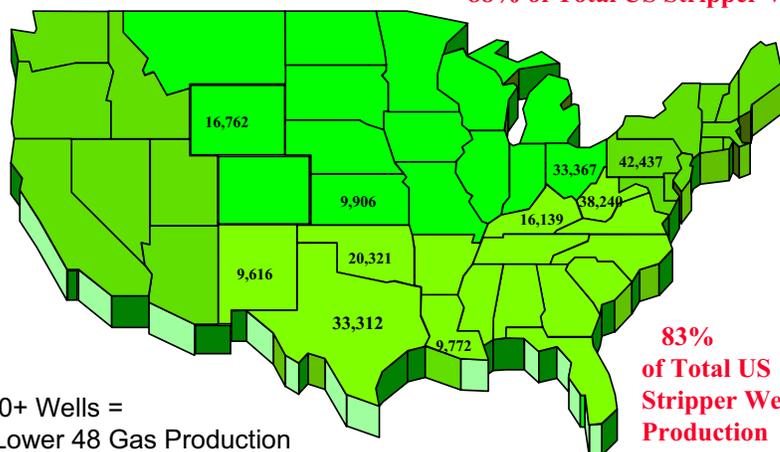
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STRIPPER WELL TECHNOLOGIES

The word "stripper" 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). 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. These resources are very important to the energy security of the U.S., as production from stripper wells represents 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 2003, the number of stripper gas wells grew for the eighth consecutive year to over 260,000. 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 49 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.

88% of Total US Stripper Wells



83%
of Total US
Stripper Well
Production

260,000+ Wells =
7% of Lower 48 Gas Production
(1.48 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. The tool operates in both 3" and 4" casing.



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 an organized helical flow. The vortex flow regime accelerates the velocity of water and reduces the friction that causes pressure drops as fluids flow through a pipe. The result is far greater efficiency when moving fluids. Seven different tools have now been developed. Test results have shown that the Vortex surface tools eliminate water build-up in low spots in flow and gas gathering lines, reducing upstream pressures. The Vortex downhole tools are designed for installation at the bottom of the tubing string and reduces the pressure drop in the string, thereby reducing the gas flow needed to lift liquids up the wellbore.



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 tolerant of fines, and has allow placement of the pump inlet below the perforations in sandy wells. Its performance advantages include the following: pumps coal fines and solids at higher concentrations than traditional systems, pumps gas/liquid mixtures, pumps dry/off with no damage (within motor limits), 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.



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. The pump has a capacity control mechanism which allows the flow rate of the device to be varied to meet increased or decreased demands without changing the rotation rate of the drive shaft. The pump functions equally well whether rotating clockwise or counterclockwise, can be mounted in any position without affecting normal operations and can handle high BTU gas. The pump is substantially smaller and lighter compared to existing products on the market.



Chemical Injector for Plunger Lift

Chemical Injector for Plunger Lift Gas Wells - Composite Engineers, Inc. has developed a simple, economical chemical system that requires no special tools to install, no service rig and no downtime. The Plunger Conveyed Chemical System consists of a modified plunger identical to the one presently being used and a chemical chamber located on the top of the lubricator. The system has 5 moving parts, most of which are in the chemical chamber located on top of the well. Chemical applications can be adjusted just as with any other well being treated. A standard oilfield chemical pump charges the CHEMICAL CHAMBER with any liquid chemical such as corrosion inhibitors, foaming agents or paraffin solvents or even a combination of chemicals, alternately. The MODIFIED PLUNGER, i.e., pad, brush, wobble washer, solid or snake of any length is available with this system. The entire system can be installed in about 15 minutes without special tools. The system does not change the plunger performance or well characteristics and is field proven and economical.