
THERMAL EVAPORATION EQUIPMENT MARKET IN THE SHALE GAS WASTEWATER TREATMENT INDUSTRY: U.S.

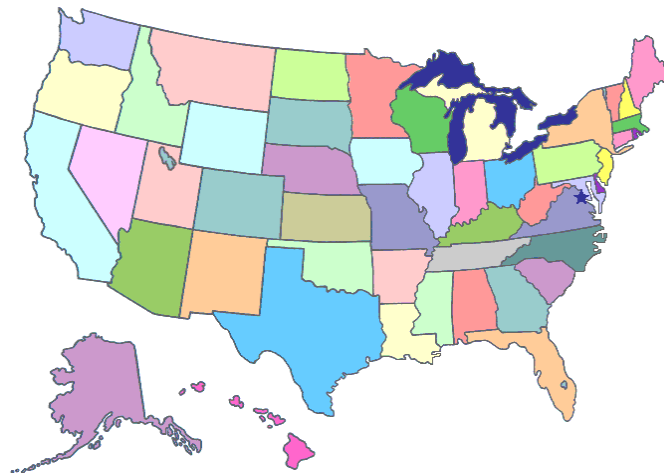


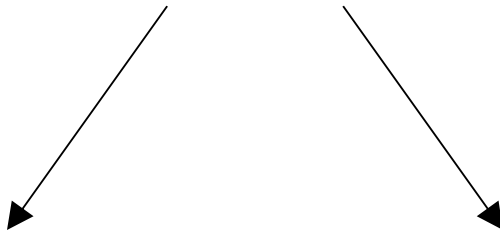
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TECHNOLOGY DEFINITION – THERMAL EVAPORATION

Evaporation typically includes thermal vapor compression (TVR) systems and mechanical vapor recompression (MVR) systems.



MVR systems are highly popular in the United States. MVR systems reduce the temperature requirements to boil water and, thus, lowers the energy requirements for treatment.

TVR systems require steam jet ejectors to raise the temperature and pressure.

- Evaporation systems are typically used for desalinating brine, removing heavy metals, nitrates, total dissolved solids (TDS), calcium and magnesium.
- The treatment of brine water with TDS concentrations of 60,000–90,000 mg/l results in fresh water recovery rates between 75 percent and 85 percent.
- Shale basins typically require some form of pretreatment to be used with evaporators. Industry participants are looking at designing modular systems that would encompass clarification or flocculation equipment, along with evaporation solutions. These modular systems will likely save space onsite and make the solution more mobile on a fracking site.

MARKET DEFINITIONS

Thermal Evaporation

For purposes of this research, thermal evaporation equipment in the shale gas industry is defined as equipment used in the treatment of industrial processes such as hydraulic fracturing and horizontal drilling that creates flowback and produced water.

Key Shale Gas Basins

This study examines the thermal evaporation equipment used in the shale gas industry within United States shale basins. Key shale basins include Barnett, Marcellus, Fayetteville, Antrim, Haynesville, Permian, Utica, Eagle Ford Shale, and Bakken Shale.

Revenue Generation

The analysis includes revenues generated from capital costs of equipment. The revenues also include rental and leasing costs. Several operators treat only the water produced on a “pay as you use” basis. The market size estimate excludes revenues generated from replacement parts, costs of valves, pumps operational expenses, and consultancy fees.