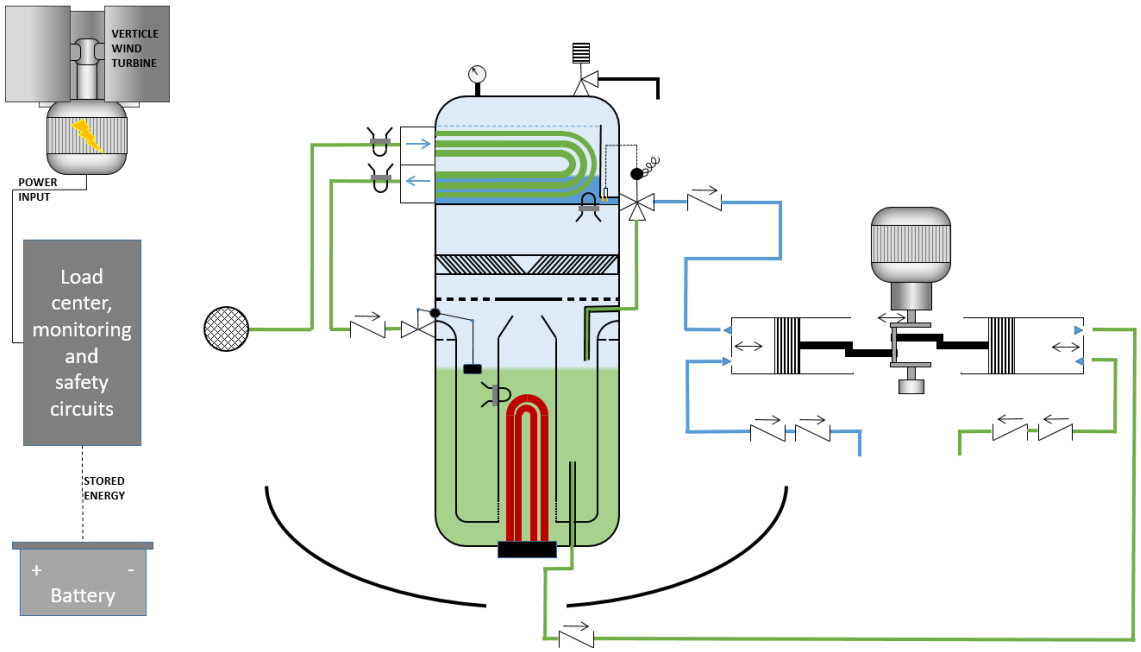
AMOS ARMBRUST amos.armbrust@gmail.com herox.com Solar Desalination Competition – **Solar Thermal Low Pressure Vapor Distillation**



This proposal is a primarily solar thermal heated, small scale, low pressure vapor distillation unit. It is of a metallic shell construction where internal and external flowpaths are deliberate in efficient regenerative heat exchanging processes. This unit is designed for coastal areas to take advantage of solar and wind resources. The primary use for this unit would be desalination of ocean salt water for potable purposes.

Assuming steady state operation, internal shell vacuum is the driving force for suction of feedwater. Incoming feedwater is preheated in the regenerative distillate condenser before being admitted to the shell. A float mechanism maintains the brine level within predetermined setpoints. The admitted feed flows into a feed ring which then is evenly distributed through a flowpath that travels along the outermost inside diameter of the shell.

Solar rays are directed via a reflector onto the outside of the shell where a thermally absorbent coating will aid in the thermal energy being transferred to the newly admitted feedwater. The reflector has the capability of rotating throughout the day to continually provide the peak amount of energy transfer to the feedwater.

The Feed travels up through a central riser section and passes over a group of auxiliary electrical heaters that if necessary close the brine temperature gap to allow for normal operations during insufficient conditions and/or nighttime operations. Saturated liquid in the brine section evaporates and travels a torturous path across a two stage moisture separator. The dislodged brine droplets fall back to the saturated liquid body to be reused or be pumped out to maintain brine concentration.

The saturated steam rises to the top of the shell and is condensed by the regenerative distillate condenser. Distillate collects in a trough and is pumped out via the distillate pump to atmospheric pressure. The brine pump strokes opposite the distillate pump. Taking suction on dislodged brine droplets to maintain brine concentration.

A salinity cell preceding in line to the three war over-salinity / under-temperature solenoid valve will prevent distillate from exceeding a salinity or temperature threshold by dumping the distillate back into the brine section until the unacceptable condition clears. The dump valve will then return to normal operation and allow distillate flow.

Resistance temperature detectors placed at key location in the system all feed into the monitoring and safety circuits. Power for the various loads is generated via a vertical wind turbine mounted on top of the unit. A deep cycle battery collects excess energy for use during insufficient condition or night operations.