

# Developing and Testing Pressurized Water Scrubbing System to Purify Biogas



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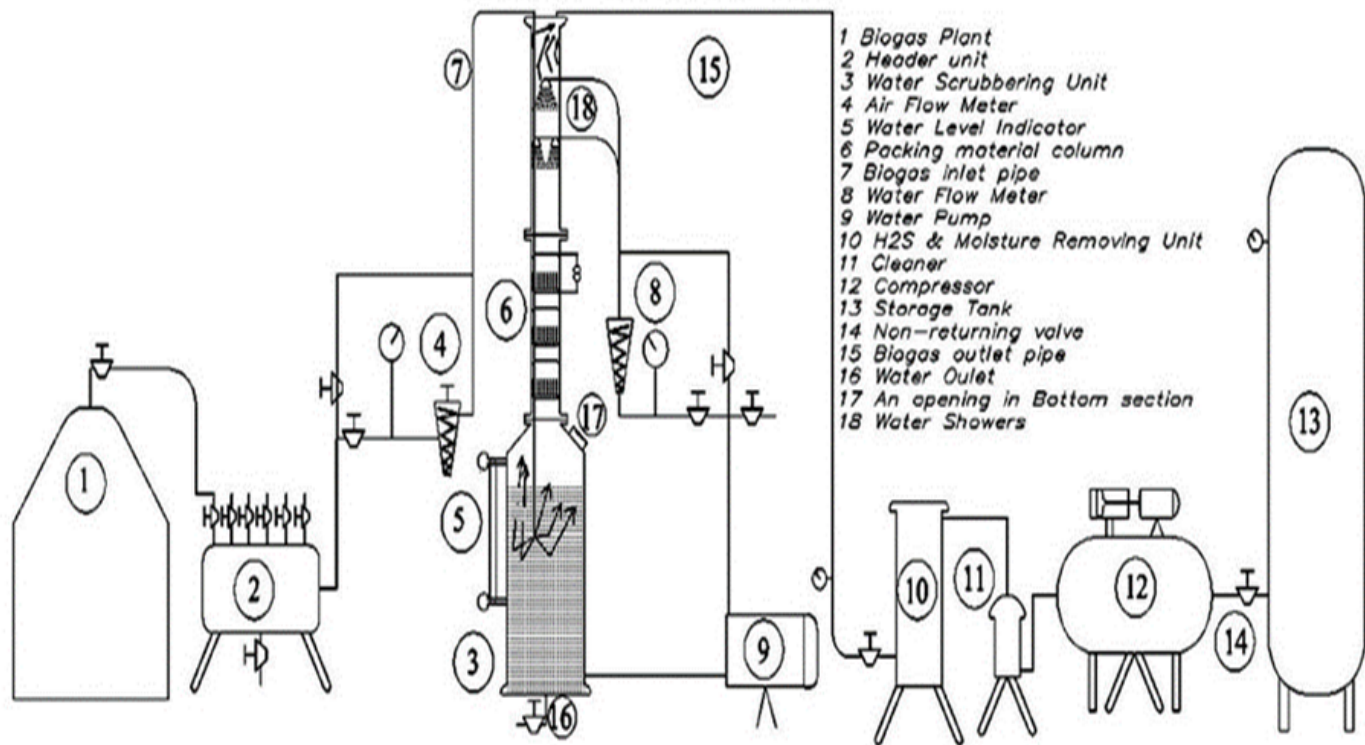
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A header unit has been installed at the UAF biogas plant site. The main purpose of header unit is to regulate the raw biogas from biogas plants to water scrubber. It is also used to connect all biogas plants and send their biogas to water scrubbing column for its purification. A gas flow meter has been installed on inlet line of biogas which is in between the header unit and the scrubbing column. Gas flow meter measures the flow rate of raw biogas in normal liter per minute (NLPM). A bypass arrangement has been made by using two control

valves. Top section of water scrubbing column consists of top cover, three showers, inlet line of water solution and inlet line of raw biogas. Middle section of water scrubbing column is a water chamber with packing material placed inside it as shown in Figure. Raw biogas is injected through the bottom section in the scrubbing column, a water level indicator has been attached with it to check the water level inside the column. This section is also used as storage of scrubbed water. A water flow meter is mounted on water inlet pipe line and is controlled by a control handle valve. A bypass setting has been made by using two control valves. A mono block centrifugal pump of 2.2 hp at 2800 rpm is used to pump and spray water into the scrubber column.

The scrubbed biogas is passed through the H<sub>2</sub>S and moisture removal cylinder. This cylinder is divided into three blocks. Iron wool is placed at lower two blocks and silica gel is placed at top block in the cylinder. Silica gel absorbs the moisture from the scrubbed biogas and iron wool reacts with the hydrogen sulphide and changes it to ferrous sulphide. Then, biogas is passed through the filter unit, which is used to remove the small particles from enriched methane biogas. A gas compressor is used to compress the biogas into the gas storage cylinder to store the purified biogas under pressure for its supply to run the engine for power generation to electrify the farm and run tubewell.



Setup for a Biogas purification plant

## Technology Impact

- Pressurized Water Scrubbing System (PWS) is highly effective to remove the impurities (CO<sub>2</sub> & H<sub>2</sub>S) for purification of biogas / enrichment of CH<sub>4</sub> with a consistent gas quality.
- The designed and developed PWS is able to remove 90% v/v of CO<sub>2</sub> present in the raw biogas.
- After removal of CO<sub>2</sub> and H<sub>2</sub>S and water vapors, biogas is converted to near natural gas, which can be used to run the petrol engine for power generation or can be bottled for easy transportation / use at commercial level.



Pressurized Water Scrubbing system at UAF biogas plant site.