CLAIMS

1. A multifunctional waste processing system for electricity and potable water generation, comprising:

a first stage fuel dryer assembly having a first pressurized vessel configured to contain sludge comprising water and solids, the first-stage dryer assembly having a second pressurized vessel adjacent to the first pressurized vessel, wherein the second pressurized vessel is configured to contain high temperature exhaust steam isolated from the sludge and that heats and partially dries the sludge and generates first sludge water in vapor phase and thickened sludge;

a second stage fuel dryer assembly having a third pressurize vessel configured to receive the thickened sludge, and fourth pressurized vessel adjacent to the third inner drying vessel, wherein the fourth pressurized vessel is configured to receive and contain the first sludge water in vapor phase so the first sludge water is isolated from the thickened sludge, and wherein the first sludge water in vapor phase heats and dries the thickened sludge to provide second sludge water in vapor phase and dried solid fuel material, and wherein at least a portion of the first sludge water is condensed to liquid phase;

a water treatment system that receives the first and second sludge water in either vapor phase or liquid phase or both, wherein the water treatment system has a condenser, a purifier, and filter, wherein the first or second sludge water in vapor phase are condensed and the first and second sludge water in liquid phase are purified and filtered to provide potable water;

a combustor assembly configured to burn the dried solid fuel from the second stage fuel dryer assembly to generate steam in a boiler; and

a steam powered generator assembly powered by the steam from the boiler and configured to generate electricity, wherein the steam powered generator assembly creates the high temperature exhaust steam.

2. The system of claim 1 wherein first pressurized vessel is contained within the second pressurized vessel.

3. The system of claim 1 wherein third pressurized vessel is contained within the fourth pressurized vessel.

4. The system of claim 1 wherein first stage fuel dryer assembly includes a steam heated auger rotatably supported in the first pressurized vessel.

5. The system of claim 1 wherein the first-stage dryer assembly comprises a plurality of scraper plates positioned in the first pressure vessel and movable relative to the second pressure vessel to move the sludge relative to the second pressure vessel.

6. The system of claim 1, wherein the steam powered generator assembly comprises a steam engine and a generator.

7. The system of claim 1 where the first and second stage fuel dryer assemblies, the water treatment system, and the generator assembly are mounted on a frame and transportable with the frame as a unit.