

CLAIMS:

1. A fluid for energy recovery use in a closed well system having an inlet well, an outlet well and lateral interconnection between said inlet well and said outlet well, characterized in that said fluid has at least one property selected from the group comprising:

a) a substantially nonlinear temperature enthalpy relationship within said lateral interconnection at pressures greater than 10MPa and temperatures less than 180°C to maximize the temperature differential and heat transfer between the fluid and the surrounding downhole heat source;

b) capable of undergoing a pressure-sensitive reversible reaction which is endothermic at elevated pressure and exothermic at pressure lower than said elevated pressure;

c) a fluid mixture containing a chemical absorption reaction which is endothermic within said lateral interconnection;

d) an aqueous electrolyte solution with temperature and pressure dependent solubility, resulting in an endothermic effect within the lateral interconnection

2. The fluid as set forth in claim 1, characterized in that said chemical absorption reaction involves the desorption of CO₂ within said lateral interconnection.

3. The fluid as set forth in claim 1, characterized in that said aqueous electrolyte solution includes magnesium sulphate.

4. A method of generating power, characterized in that the method comprises:

providing a closed well loop circuit having an inlet and an outlet connected with a lateral conduit within a geological formation;

providing a power generation apparatus in operative communication with said well loop;

circulating a working fluid having a substantially nonlinear temperature enthalpy relationship within said lateral conduit at pressures greater than 10 MPa and temperatures less than 180°C through said circuit to recover heat energy from said formation to maximize the temperature differential and heat transfer between said fluid and the surrounding downhole heat source;

cooling said working fluid prior to recirculation in said loop at said inlet; and

converting energy from said fluid into electrical power.

5. The method as set forth in claim 4, characterized in that said working fluid is cooled to a sub-zero°C temperature.

6. The method as set forth in claim 4, characterized in that circulation is driven by thermosiphon action.

7. The method as set forth in claim 4, further including providing a plurality of lateral conduits in spaced relation each connected to said inlet and said outlet.

8. The method as set forth in claim 4, characterized in that said working fluid is conditioned to remain in a liquid state or supercritical liquid state within said inlet and exit said outlet in a supercritical state.

9. A method of repurposing an oilfield having pre-existing production wells and injection wells in spaced relation in a formation to capture heat energy, characterized in that the method comprises:

providing a first node having a production well and a first injection well in fluid communication with a power generation apparatus;

providing a second node having a production well and a second injection well in fluid communication with a power generation apparatus in spaced relation to said first node;

connecting said first node and said second node in a subterranean horizontal connection;

circulating heated output fluid from said power generation apparatus of said first node to an input of said power generation apparatus of said second node with a subterranean connection, said fluid having a substantially nonlinear temperature enthalpy relationship within said subterranean horizontal connection at pressures greater than 10MPa and temperatures less than 180°C to recover heat energy from said formation to maximize the temperature differential and heat transfer between said fluid and the surrounding downhole heat source; and

converting energy from said fluid into electrical power.

10. An energy production method, characterized in that the method comprises:

providing a suspended oilfield having injection and production well pairs

connecting a power generation apparatus between the production well of one well pair and the injection well of an adjacent well pair in a subterranean loop, said loop having at least one lateral interconnection between said production well and said injection well ;

circulating a fluid through said loop to recover subterranean heat energy, said fluid having at least one property selected from the group, comprising:

- a) a substantially nonlinear temperature enthalpy relationship within said lateral interconnection at pressures greater than 10MPa and temperatures less than 180°C to maximize the temperature differential and heat transfer between the fluid and the surrounding downhole heat source;
- b) capable of undergoing a pressure-sensitive reversible reaction which is endothermic at elevated pressure and exothermic at pressure lower than the elevated pressure;
- c) a fluid mixture containing a chemical absorption reaction which is endothermic within the lateral interconnection;
- d) an aqueous electrolyte solution with temperature and pressure dependent solubility, resulting in an endothermic effect within the lateral interconnection; and

utilizing thermal energy from said fluid directly and/or converting energy from said fluid into electrical power.

11. A geothermal method, characterized in that said method comprises:

drilling a first generally U shaped bore hole into an earth formation and a second generally U shaped bore hole in spaced relation therefrom;

providing a power generation apparatus;

connecting in a subterranean position said apparatus to an output of said first U shaped bore hole and an inlet of said second U shaped bore hole;

circulating a fluid through each said bore hole, said fluid having at least one property selected from the group comprising:

- a) a substantially nonlinear temperature enthalpy relationship within the lateral interconnection of said U shaped bore hole at pressures greater than 10MPa and temperatures less than 180°C to maximize the temperature differential and heat transfer between the fluid and the surrounding downhole heat source;
- b) capable of undergoing a pressure-sensitive reversible reaction which is endothermic at elevated pressure and exothermic at pressure lower than the elevated pressure;
- c) a fluid mixture containing a chemical absorption reaction which is endothermic within the lateral interconnection;
- d) an aqueous electrolyte solution with temperature and pressure dependent solubility, resulting in an endothermic effect within the lateral interconnection; and converting energy from said fluid into electrical power.

12. A method of forming a geothermal heat exchanger, characterized in that said method comprises:

providing a unused drilled well;

drilling a second well in spaced relation to said unused well;

linking said unused drilled well and said second well within a geothermal zone and a second zone spaced therefrom in a continuous loop having at least one lateral linking interconnection;

circulating a working liquid through said loop for heat exchange within said loop, said fluid having at least one property selected from the group, comprising:

- a) a substantially nonlinear temperature enthalpy relationship within said lateral interconnection at pressures greater than 10MPa and temperatures less than 180°C to maximize the temperature differential and heat transfer between the fluid and the surrounding downhole heat source;
- b) capable of undergoing a pressure-sensitive reversible reaction which is endothermic at elevated pressure and exothermic at pressure lower than the elevated pressure;
- c) a fluid mixture containing a chemical absorption reaction which is endothermic within the lateral interconnection;
- d) an aqueous electrolyte solution with temperature and pressure dependent solubility, resulting in an endothermic effect within the lateral interconnection; and recovering heat energy.

13. A method for recycling unused drilled wells, characterized in that the method comprises:

designating a first unused well as a receiving hub;

drilling a second new well adjacent said hub;

drilling at least a third new well spaced from said hub and said second new well;

connecting in fluid communication each of said second new well and said third well with said hub in individual closed loops each having at least one lateral interconnection, a first section of each loop being within a geothermal zone and a second section being above said geothermal zone;

circulating a working fluid within said loops, said fluid having at least one property selected from the group comprising:

- a) a substantially nonlinear temperature enthalpy relationship within said lateral interconnection at pressures greater than 10MPa and temperatures less than 180°C to maximize the temperature differential and heat transfer between the fluid and the surrounding downhole heat source;
- b) capable of undergoing a pressure-sensitive reversible reaction which is endothermic at elevated pressure and exothermic at pressure lower than the elevated pressure;
- c) a fluid mixture containing a chemical absorption reaction which is endothermic within the lateral interconnection;
- d) an aqueous electrolyte solution with temperature and pressure dependent solubility, resulting in an endothermic effect within the lateral interconnection; and

capturing heat energy transferred from said geothermal zone.