What Is Claimed Is:

1. ~~1.~~ A power system that generates at least one of direct electrical energy and thermal energy comprising:

at least one vessel;

a reaction mixture comprising reactants comprising:

a) ~~–~~ at least one source of ~~catalyst or a catalyst comprising~~ nascent H_2O;

b) ~~-~~ at least one source of atomic hydrogen ~~or atomic hydrogen;~~;

c) ~~-~~ at least one of a conductor and a conductive matrix; and

at least one set of electrodes ~~to confine at least one hydrino reactant~~, wherein said reaction mixture is disposed between said set of electrodes,

a source of electrical power to deliver ~~a short burst of high current~~ electrical energy to the reaction mixture to produce a plasma and reaction products;

~~a reloading system;~~

at least one system to regenerate ~~the initial~~one or more reactants from the reaction products~~,~~ and produce another reaction mixture,

a reloading system configured to deliver each reaction mixture to the electrodes; and

at least one plasma dynamic converter or at least one photovoltaic converter.

~~2.~~ The power system of Claim 1, wherein the ~~vessel is capable of a pressure of at least one of atmospheric, above atmospheric, and below atmospheric.~~

~~3.~~ ~~The power system of Claim 1 wherein reactants comprise a~~ source of nascent H_2O ~~and a conductive matrix to form at least one of the source of catalyst, the catalyst, the source of atomic hydrogen, and the atomic hydrogen.~~

~~4.~~2. ~~A power system of Claim 3 wherein the reactants comprising a source of H_2O comprise~~comprises at least one of bulk H_2O, a state other than bulk H_2O, a compound or compounds that undergo at least one of ~~react to form H_2O and release bound H_2O.~~:

react to form H_2O, and release bound H_2O.

5. The~~A power system of Claim 4 wherein the bound H_2O comprises a compound that interacts with H_2O wherein the H_2O is in a state of at least one of absorbed H_2O, bound H_2O, physisorbed H_2O, and waters of hydration.~~

~~6.~~3. ~~A~~ power system of Claim 1 or Claim 2, wherein the reactants comprise a conductor and one or more compounds or materials that undergo at least one of release of bulk H_2O, absorbed H_2O, bound H_2O, physisorbed H_2O, and waters of hydration, and have nascent H_2O as a reaction product.

~~7.~~4. The power system of ~~Claim 1~~any one of Claims 1 to 3, wherein at least one of the source of nascent H_2O ~~catalyst~~ and the source of atomic hydrogen comprises at least one of:

~~a)~~ a) at least one source of H_2O;

~~b)~~ b) at least one source of oxygen, and

~~c)~~ c) at least one source of hydrogen.

~~8.~~ The power system of ~~Claim~~any one of Claims 1 to 4, wherein the reactants ~~to form at least one of the source of catalyst, the catalyst, the source of atomic hydrogen, and the atomic hydrogen~~ comprise at least one of

~~a) H_2O and the source of H_2O;~~

~~b)~~5. O_2, H_2O, HOOH, OOH^-~~,~~, peroxide ion, superoxide ion, hydride, H_2, a halide, an oxide, an oxyhydroxide, a hydroxide, a compound that comprises oxygen, a hydrated compound, a hydrated compound selected from the group of at least one of a halide, an oxide, an oxyhydroxide, a hydroxide, a compound that comprises oxygen~~;~~ ~~and~~ .

~~c) a conductive matrix.~~

~~A~~

~~9.~~6. The power system of Claim ~~8~~5, wherein the oxyhydroxide comprises at least one from the group of TiOOH, GdOOH, CoOOH, InOOH, FeOOH, GaOOH, NiOOH, AlOOH, CrOOH, MoOOH, CuOOH, MnOOH, ZnOOH, and SmOOH;

the oxide comprises at least one from the group of CuO, Cu_2O, CoO, ~~Co_2O_3,~~ ~~Co_3O_4~~CO_2O_3, CO_3O_4, FeO, Fe_2O_3, NiO, and Ni_2O_3;

the hydroxide comprises at least one from the group of $Cu(OH)_2$, $Co(OH)_2$, $Co(OH)_3$, $Fe(OH)_2$, $Fe(OH)_3$, and $Ni(OH)_2$;

the compound that comprises oxygen comprises at least one from the group of a sulfate, phosphate, nitrate, carbonate, hydrogen carbonate, chromate, pyrophosphate, persulfate, perchlorate, perbromate, and periodate, MXO_3, MXO_4 (M = metal such as alkali metal such as Li, Na, K, Rb, Cs; X = F, Br, ~~Cl~~CI, I), cobalt magnesium oxide, nickel magnesium oxide, copper magnesium oxide, Li_2O, alkali metal oxide, alkaline earth metal oxide, CuO, CrO_4, ZnO, MgO, CaO, MoO_2, TiO_2, ZrO_2, SiO_2, Al_2O_3, NiO, FeO, Fe_2O_3, TaO_2, Ta_2O_5, VO, VO_2, V_2O_3, V_2O_5, P_2O_3, P_2O_5, B_2O_3, NbO, NbO_2, Nb_2O_5, SeO_2, SeO_3, TeO_2, TeO_3, WO_2, WO_3, Cr_3O_4, Cr_2O_3, CrO_2, CrO_3, CoO, Co_2O_3, Co_3O_4, FeO, Fe_2O_3, NiO, Ni_2O_3, rare earth oxide, CeO_2, La_2O_3, an oxyhydroxide, TiOOH, GdOOH, CoOOH, InOOH, FeOOH, GaOOH, NiOOH, ~~AlOOH~~AlOOH, CrOOH, MoOOH, CuOOH, MnOOH, ZnOOH, and SmOOH, and

the conductive matrix comprises at least one from the group of a metal powder, carbon, carbide, boride, nitride, carbonitrile such as TiCN, or nitrile.

~~10.~~7. The power system of Claim 1, wherein the reactants comprise a mixture of a metal~~,~~ and its metal oxide~~, and H_2O wherein the reaction of the metal with H_2O is not thermodynamically favorable.~~ ; or

~~11. The power system of Claim 1 wherein the reactants comprise~~ a mixture of a metal~~,~~ and a metal halide~~, and H_2O wherein the reaction of the metal with H_2O is not thermodynamically favorable.~~ ; or

12. The power system of Claim 1 wherein the reactants comprise a mixture of a transition metal, an alkaline earth metal halide, and H_2O wherein the reaction of the metal with H_2O is not thermodynamically favorable.; or

13. A power system of Claim 1 wherein the reactants comprise a mixture of a conductor, a hydroscopichygroscopic material, and H_2O.

14.8. The power system of Claim 1 or 13, wherein the conductor comprises a metal powder or carbon powder wherein the reaction of the metal or carbon with H_2O is not thermodynamically favorable.

15.9. The power system of Claim 131, wherein the hydroscopicreactants comprise a mixture of a conductor, a hygroscopic material, and H_2O, and wherein the hygroscopic material comprises at least one of the group of lithium bromide, calcium chloride, magnesium chloride, zinc chloride, potassium carbonate, potassium phosphate, carnallite such as $KMgCl_3 \cdot 6(H_2O)$, ferric ammonium citrate, potassium hydroxide and sodium hydroxide and concentrated sulfuric and phosphoric acids, cellulose fibers, sugar, caramel, honey, glycerol, ethanol, methanol, diesel fuel, methamphetamine, a fertilizer chemical, a salt, a desiccant, silica, activated charcoal, calcium sulfate, calcium chloride, a molecular sieves, a zeolite, a deliquescent material, zinc chloride, calcium chloride, potassium hydroxide, sodium hydroxide and a deliquescent salt.

16. The power system of Claim 15 comprising a mixture of a conductor, hydroscopic materials, and H_2O wherein the ranges of relative molar amounts of (metal), (hydroscopic material), (H_2O) are at least one of about (0.000001 to 100000), (0.000001 to 100000), (0.000001 to 100000); (0.00001 to 10000), (0.00001 to 10000), (0.00001 to 10000); (0.0001 to 1000), (0.0001 to 1000), (0.0001 to 1000); (0.001 to 100), (0.001 to 100), (0.001 to 100); (0.01 to 100), (0.01 to 100), (0.01 to 100); (0.1 to 10), (0.1 to 10), (0.1 to 10); and (0.5 to 1), (0.5 to 1), (0.5 to 1).

The power system of Claims 10, 11, 12, or 14 wherein the metal having a thermodynamically unfavorable reaction with H_2O

17.10. The power system of Claim 7, wherein the metal is at least one of the group of Cu, Ni, Pb, Sb, Bi, Co, Cd, Ge, Au, Ir, Fe, Hg, Mo, Os, Pd, Re, Rh, Ru, Se, Ag, Tc, Te, Tl, Sn, W, Al, V, Zr, Ti, Mn, Zn, Cr, and In.

18. The power system of Claim 17 wherein reactants are regenerated by addition of H_2O.

19. The power system of Claim 1, wherein the reactants comprise a mixture of a metal, and its metal oxide, and H_2O wherein the metal oxide is capable of H_2 reduction at a temperature less than 1000 °C.

20. The power system of Claim 1 wherein the reactants comprise a mixture of an oxide that is not easily reduced with H_2 and mild heat;

~~a metal having an oxide capable of being reduced to the metal with H_2 at a temperature less than 1000 °C, and~~

~~H_2O.~~

~~21.~~11. ~~The power system of Claims 19 or 20 wherein the metal having an oxide capable of being reduced to the metal with H_2 at a temperature less than 1000 °C~~ is at least one of the group of Cu, Ni, Pb, Sb, Bi, Co, Cd, Ge, Au, Ir, Fe, Hg, Mo, Os, Pd, Re, Rh, Ru, Se, Ag, Tc, Te, Tl, Sn, W, Al, V, Zr, Ti, Mn, Zn, Cr, and In.

~~22.~~12. The power system of Claim ~~20~~1, wherein the reactants comprise a mixture of a metal and its metal oxide ~~that is not easily reduced with H_2, and mild heat~~, and wherein the metal oxide comprises at least one of alumina, an alkaline earth oxide, and a rare earth oxide.

~~23. The power system of Claim 1 wherein the solid fuel comprises carbon or activated carbon and H_2O wherein the mixture is regenerated by rehydration comprising addition of H_2O.~~

~~The power system of Claim 1 wherein the reactants comprise at least~~

~~24.~~ The power system of any one of ~~a slurry, solution, emulsion, composite, and a compound.~~

~~25. The power system of Claim 1 wherein the H_2O mole % content may be in the range of at least one of about 0.000001%~~ Claims 1 to ~~100%, 0.00001% to 100%, 0.0001% to 100%, 0.001% to 100%, 0.01% to 100%, 0.1% to 100%, 1% to 100%, 10% to 100%, 0.1% to 50%, 1% to 25%, and 1% to 10%.~~

~~26. The power system of Claim 1 wherein the current of the source of electrical power to deliver a short burst of high current electrical energy is sufficient enough to cause the hydrino reactants to undergo the reaction to form hydrinos at a very high rate.~~

~~27. The power system of Claim 1 wherein the source of electrical power to deliver a short burst of high current electrical energy comprises at least one of the following:~~

~~a voltage selected to cause a high AC, DC, or an AC-DC mixture of current that is in the range of at least one of 100 A to 1,000,000 A, 1 kA to 100,000 A, 10 kA to 50 kA;~~

~~a DC or peak AC current density in the range of at least one of 100 A/cm^2 to 1,000,000 A/cm^2, 1000 A/cm^2 to 100,000 A/cm^2, and 2000 A/cm^2 to 50,000 A/cm^2;~~

~~the voltage is determined by the conductivity of the solid fuel or energetic material wherein the voltage is given by the desired current times the resistance of the solid fuel or energetic material sample;~~

~~the DC or peak AC voltage may be in at least one range chosen from about 0.1 V to 500 kV, 0.1 V to 100 kV, and 1 V to 50 kV, and~~

~~the AC frequency may be in the range of about 0.1 Hz to 10 GHz, 1 Hz to 1 MHz, 10 Hz to 100 kHz, and 100 Hz to 10 kHz.~~

28. The power system of Claim 1 wherein the resistance of the solid fuel or energetic material sample is in at least one range chosen from about 0.001milliohm to 100 Mohm, 0.1 ohm to 1 Mohm, and 10 ohm to 1 kohm, and

the conductivity of a suitable load per electrode area active to form hydrinos is in at least one range chosen from about 10^{-10} ohm^{-1} cm^{-2} to 10^{6} ohm^{-1} cm^{-2}, 10^{-5} ohm^{-1} cm^{-2} to 10^{6} ohm^{-1} cm^{-2}, 10^{-4} ohm^{-1} cm^{-2} to 10^{5} ohm^{-1} cm^{-2}, 10^{-3} ohm^{-1} cm^{-2} to 10^{4} ohm^{-1} cm^{-2}, 10^{-2} ohm^{-1} cm^{-2} to 10^{3} ohm^{-1} cm^{-2}, 10^{-1} ohm^{-1} cm^{-2} to 10^{2} ohm^{-1} cm^{-2}, and 1 ohm^{-1} cm^{-2} to 10 ohm^{-1} cm^{-2}.

29. The power system of Claim 1 wherein the regeneration system comprises at least one of a hydration, thermal, chemical, and electrochemical system.

30.13. The power system of Claim 112, wherein the photovoltaic power converter includes a photon-to-electric power converter.

31.14. The methodpower system of claim 3013, further including a light distribution system.

32.15. The power system of Claim 3114, further comprising a concentrated photovoltaic device.

33.16. The power system of Claimany one of Claims 1 to 12, wherein the photovoltaic power converter includes a photon-to-thermal power converter.

34.17. The power system of Claim 3316, further comprising a thermal-to-electric power converter.

35.18. The power system of Claim 1, further comprising a concentrated solar power device.

36. The power system of Claim 1, further comprising a tracker.

37. The power system of Claim 1, further comprising an energy storage device.

38. The power system of Claim 1, wherein the power system is operably connected to a power grid.

39. The power system of Claim 1, wherein the power system is a stand-alone system.

40.19. The power system of Claim 1, wherein the photovoltaic power converter includes a plurality of multi-junction photovoltaic cells.

41.20. The power system of Claim 4019, wherein the multi-junction photovoltaic cells are triple-junction photovoltaic cells.

42. The power system of Claim 1, wherein the photovoltaic power converter is located within a vacuum cell.

43. The power system of Claim 1, wherein the photovoltaic power converter includes at

least one of an antireflection coating, an optical impedance matching coating, or a protective coating.

44. The power system of Claim 1, wherein the photovoltaic power converter is operably coupled to a cleaning system configured to clean at least a portion of the photovoltaic power converter.

45. The power system of Claim 1, further comprising an optical filter.

46. The power system of Claim 1, wherein the photovoltaic power converter comprises at least one of a monocrystalline cell, a polycrystalline cell, an amorphous cell, a string/ribbon silicon cell, a multi-junction cell, a homojunction cell, a heterojunction cell, a p-i-n device, a thin-film cell, a dye-sensitized cell, and an organic photovoltaic cell.

47. The power system of Claim 1, wherein the photovoltaic power converter comprises at multi-junction cell, wherein the multi-junction cell comprises at least one of an inverted cell, an upright cell, a lattice-mismatched cell, a lattice-matched cell, and a cell comprising Group III-V semiconductor materials.

48. A power system of Claim 1, further comprising

an output power conditioner operably coupled to the photovoltaic power converter; and

an output power terminal operably coupled to the output power conditioner.

49. The power system of Claim 1, further comprising an inverter.

50. The power system of claim 1, further comprising an energy storage device.

51. The power system of claim 50, wherein a portion of power output from the output power terminal is directed to the energy storage device.

52. The power system of claim 50, wherein a portion of power output from the output power terminal is directed to a component of the power generation system.

53. The power generation system of claim 50, wherein a portion of power output from the output power terminal is directed to the plurality of electrodes.

54. The power generation system of claim 50, wherein a portion of power output from the output power terminal is directed to an external load.

55. The power generation system of claim 50, wherein a portion of power output from the output power terminal is directed to a power grid.

56. A method of producing electrical power, comprising:

supplying a fuel to a region between a plurality of electrodes;

energizing the plurality of electrodes to ignite the fuel to form a plasma;

converting a plurality of plasma photons into electrical power with a photovoltaic power converter; and

outputting at least a portion of the electrical power.

57. A method of producing electrical power, comprising:

supplying a fuel to a region between a plurality of electrodes;

energizing the plurality of electrodes to ignite the fuel to form a plasma;

converting a plurality of plasma photons into thermal power with a photovoltaic power converter;

converting the thermal power into electrical power; and

outputting at least a portion of the electrical power.

58. A method of generating power, comprising:

delivering an amount of fuel to a fuel loading region, wherein the fuel loading region is located among a plurality of electrodes;

igniting the fuel by flowing a current of at least about 2,000 A/cm^2 through the fuel by applying the current to the plurality of electrodes to produce at least one of plasma, light, and heat;

receiving at least a portion of the light in a photovoltaic power converter;

converting the light to a different form of power using the photovoltaic power converter; and

outputting the different form of power.

59. A water arc plasma power system comprising:

at least one closed reaction vessel;

reactants comprising at least one of source of H_2O and H_2O;

at least one set of electrodes;

a source of electrical power to deliver an initial high breakdown voltage of the H_2O and provide a subsequent high current;

a photovoltaic power converter; and

a heat exchanger system,

wherein the power system generates arc plasma, light, and thermal energy.

60. A power generation system comprising:

an electrical power source of at least about 2,000 A/cm^2 or of at least about 5,000 kW;

a plurality of electrodes electrically coupled to the electrical power source;

a fuel loading region configured to receive a solid fuel, wherein the plurality of electrodes is configured to deliver electrical power to the solid fuel to produce a plasma; and

a photovoltaic power converter positioned to receive a plurality of plasma photons.

61. A power generation system, comprising:

an electrical power source configured to deliver power of at least about 5,000 kW or of at least about 2,000 A/cm^2;

a plurality of spaced apart electrodes, wherein the plurality of electrodes at least partially surround a fuel, are electrically connected to the electrical power source, are configured to receive a current to ignite the fuel, and at least one of the plurality of electrodes is moveable;

a delivery mechanism for moving the fuel; and

a photovoltaic power converter configured to convert photons generated from the ignition of the fuel into a different form of power.

62. A power system, comprising:

an electrical power source configured to deliver power of at least about 5,000 kW or of at least about 2,000 A/cm^2;

a plurality of spaced apart electrodes, wherein at least one of the plurality of electrodes includes a compression mechanism;

a fuel loading region configured to receive a fuel, wherein the fuel loading region is surrounded by the plurality of electrodes so that the compression mechanism of the at least one electrode is oriented towards the fuel loading region, and wherein the plurality of electrodes are electrically connected to the electrical power source and configured to supply power to the fuel received in the fuel loading region to ignite the fuel;

a delivery mechanism for moving the fuel into the fuel loading region; and

a photovoltaic power converter configured to convert photons generated from the ignition of the fuel into a non-photon form of power.

63. A power generation system, comprising:

a plurality of electrodes;

a fuel loading region surrounded by the plurality of electrodes and configured to receive a fuel, wherein the plurality of electrodes is configured to ignite the fuel located in the fuel loading region;

a delivery mechanism for moving the fuel into the fuel loading region;

a photovoltaic power converter configured to convert photons generated from the ignition of the fuel into a non-photon form of power;

a removal system for removing a byproduct of the ignited fuel; and

a regeneration system operably coupled to the removal system for recycling the removed byproduct of the ignited fuel into recycled fuel.

64. A power system, comprising:

an electrical power source configured to deliver power of at least about 5,000 kW or of at least about 2,000 A/cm^2;

a plurality of spaced apart electrodes electrically connected to the electrical power source; a fuel loading region configured to receive a fuel, wherein the fuel loading region is surrounded by the plurality of electrodes, and wherein the plurality of electrodes is configured to supply power to the fuel to ignite the fuel when received in the fuel loading region;

a delivery mechanism for moving the fuel into the fuel loading region;

a photovoltaic power converter configured to convert a plurality of photons generated

from the ignition of the fuel into a non-photon form of power;

a sensor configured to measure at least one parameter associated with the power generation system; and

a controller configured to control at least a process associated with the power generation system.

65. A power system, comprising:

an electrical power source configured to deliver power of at least about 5,000 kW or of at least about 2,000 A/cm^2;

a plurality of spaced apart electrodes electrically connected to the electrical power source;

a fuel loading region configured to receive a fuel, wherein the fuel loading region is surrounded by the plurality of electrodes, and wherein the plurality of electrodes is configured to supply power to the fuel to ignite the fuel when received in the fuel loading region;

a delivery mechanism for moving the fuel into the fuel loading region;

a photovoltaic power converter configured to convert a plurality of photons generated from the ignition of the fuel into a non-photon form of power;

a sensor configured to measure at least one parameter associated with the power generation system; and

a controller configured to control at least a process associated with the power generation system.

66. A power generation system, comprising:

an electrical power source configured to deliver power of at least about 5,000 kW or of at least about 2,000 A/cm^2;

a plurality of spaced apart electrodes electrically connected to the electrical power source;

a fuel loading region configured to receive a fuel, wherein the fuel loading region is surrounded by the plurality of electrodes, and wherein the plurality of electrodes is configured to supply power to the fuel to ignite the fuel when received in the fuel loading region, and wherein a pressure in the fuel loading region is a partial vacuum;

a delivery mechanism for moving the fuel into the fuel loading region; and

a photovoltaic power converter configured to convert a plurality of photons generated from the ignition of the fuel into a non-photon form of power.

67. The power system of any of Claims 59 through 66, wherein the photovoltaic power converter is located within a vacuum cell.

68. The power system of Claims 59 through 66, wherein the photovoltaic power converter includes at least one of an antireflection coating, an optical impedance matching coating, or a protective coating.

69. The power system of Claims 59 through 66, wherein the photovoltaic power converter is operably coupled to a cleaning system configured to clean at least a portion of the photovoltaic power converter.

70. The power system of Claims 59 through 66, further comprising an optical filter.

71. The power system of Claims 59 through 66, wherein the photovoltaic power converter comprises at least one of a monocrystalline cell, a polycrystalline cell, an amorphous cell, a string/ribbon silicon cell, a multi-junction cell, a homojunction cell, a heterojunction cell, a p-i-n device, a thin-film cell, a dye-sensitized cell, and an organic photovoltaic cell.

72. The power system of Claim 71, wherein the photovoltaic power converter comprises at multi-junction cell, wherein the multi-junction cell comprises at least one of an inverted cell, an upright cell, a lattice-mismatched cell, a lattice-matched cell, and a cell comprising Group III-V semiconductor materials.

73. A system configured to produce power, comprising:
a fuel supply configured to supply a fuel;
a power supply configured to supply an electrical power; and
at least one gear configured to receive the fuel and the electrical power, wherein the at least one gear selectively directs the electrical power to a local region about the gear to ignite the fuel within the local region.

74. The system of claim 73, wherein the fuel includes a powder.

75. The system of claim 73, wherein the at least one gear includes two gears.

76. The system of claim 73, wherein the at least one gear includes a first material and a second material having a lower conductivity than the first material, the first material being electrically coupled to the local region.

77. The system of claim 73, wherein the local region is adjacent to at least one of a tooth and a gap of the at least one gear.

78. A method of producing electrical power, comprising:
supplying a fuel to a gear;
rotating the gear to localize at least some of the fuel at a region of the gear;
supplying a current to the gear to ignite the localized fuel to produce energy; and
converting at least some of the energy produced by the ignition into electrical power.

79. The method of claim 78, wherein rotating the gear includes rotating a first gear and a second gear, and wherein supplying a current includes supplying a current to the first gear and the second gear.