CLAIMS

What is claimed is:

1. A buoyant module comprising:

at least one base configured for being buoyantly supported within a body of water;

at least one fluid-holding container sized and fitted for being connected with said at least one base for movement in a vertical dimension relative to said at least one base;

at least one mount coupled to said at least one base in a sealing engagement against the egress of liquids into the interior of said at least one base and configured for pivotably mounting at least one solar panel thereon, wherein said mount comprises at least one opening sized and shaped to fit said at least one container and enable said movement in said vertical dimension,; and

at least one support frame, attached to the at least one mount and carrying said at least one solar panel;

wherein said at least one support frame is tiltable about a pivot point relative to said mount;

and wherein a vertical position of said at least one fluid-holding container relative to said base is determined, at least in part, by a fluid level in said at least one fluid-holding container.

2. The module of claim 1, wherein said at least one base defines a space therewithin; further wherein said at least one fluid-holding container is sized and fitted for being received within said space.

3. The module of claim 1, wherein said at least one base comprises at least two hulls arranged in a spaced-apart position, wherein said hulls are rigidly interconnected to one another, and wherein said at least one fluid-holding container is disposed therebetween said hulls, further wherein said hulls are made of at least one selected from a group consisting of solid, at least partially hollow, entirely hollow hulls and any combination thereof.

4. The module of any one of claims 1-3, wherein at least one of: (a) said at least one base is at least partially filled with a ballast comprising at least one selected from a group consisting a liquid, a solid, and any combination thereof; (b) said base is in fluid communication with said body of water; (c) any combination thereof.

5. The module of claim 1, further comprising a tilt mechanism configured for translating said movement in said vertical dimension of said at least one fluid-holding container into said pivotable motion of said at least one support frame about said pivot point; further wherein said tilt mechanism is configured for tilting said at least one support frame between 25° and 75° to either side relative to the horizontal; in response to at least one selected from a group consisting of the sun direction, wind, ambient conditions, changing seasons and any combination thereof; further wherein said tilt mechanism is configured such that a center of gravity of said solar panel is located below or on said pivot point.

6. The module of claim 5, wherein said tilt mechanism comprises one at least one mechanism selected from a group consisting of: (a) a cable-and-pully tilt mechanism, comprising: (i) at least one first cable coupled to the upper portion of said at least one fluid-holding container; (ii) at least one second cable coupled to the bottom portion of said at least one fluid-holding container; said at least one first cable and said at least one second cable are coupled to said at least one solar panel at two opposing ends thereof, such that a vertical movement of said at least one fluid-holding container exerts pulling forces on at least one selected from a group consisting of at least one first cable, at least one second cable and any combination thereof to result in pivoting movement of said at least one solar panel, (b) a crank-like tilt mechanism, (c) an arcuate slot tilt mechanism, comprising: at least one support frame in communication with said at least one solar panel, comprising one or more brackets having an arcuate guide slot wherein said at least one fluid-holding container is in communication with at least one guide pin fitted within said guide slot; such that said movement in said vertical dimension of at least one fluid-holding container is thus translated into angular movement of said support frame and said at least one solar panel, (d) a parallelogram with an underwater symmetrical frame, (e) a parallelogram with an underwater asymmetrical frame and push/pull rods; and any combination thereof.

7. The module of any of claims 1-5, further comprising a control unit in fluid communication with said at least one fluid-holding container, wherein the control unit is configured for selectively adjusting a fluid level within said at least one fluid-holding container further wherein said module further comprising at least one pipe connected between said control unit and said at least one fluid-holding container.

8. A system comprising:

a plurality of buoyant modules comprising each:

at least one base configured for being buoyantly supported within a body of water, and

at least one fluid-holding container sized and fitted for being connected with said at least one base, adapted for movement in the vertical dimension relative to said at least one base, wherein a vertical position of said at least one fluid-holding container relative to said at least one base is based, at least in part, on a fluid level in said at least one fluid-holding container;

at least one mount coupled to said at least one base in a sealing engagement against the egress of liquids into the interior of said at least one base and configured for pivotably mounting at least one solar panel thereon, wherein said mount comprises at least one opening sized and shaped to fit said at least one container and enable said movement in said vertical dimension,; and

at least one support frame, attached to the at least one mount and carrying said at least one solar panel;

wherein said at least one support frame is tiltable about a pivot point relative to said mount;

a framework comprising frame members configured for rigidly interconnecting at least two of said bases to at least one module from the plurality of buoyant modules in a specified arrangement; and

a control unit in fluid communication with each of said at least one fluid-holding container, wherein the control unit is configured for selectively adjusting a fluid level within said at least one fluid-holding container.

9. The system of claim 8, wherein said plurality of modules is arranged in a grid array field comprising at least one row and at least one column.

10. The system of any of claims 8-9, wherein said at least one fluid-holding container is sized and fitted for being received within said space.

11. The system of any of claims 8-10, wherein said at least one base comprises at least two hulls arranged in a spaced-apart position, wherein said hulls are rigidly interconnected to one another, and wherein said space is disposed therebetween said hulls; further wherein said hulls are made of at least one selected from a group consisting of solid, at least partially hollow, entirely hollow hulls and any combination thereof.

12. The system of any one of claims 8-11, wherein at least one of (a) base is at least partially filled with a ballast comprising at least one selected from a group consisting of liquid, solid and any combination thereof; (b) said base is in fluid communication with said body of water; (c) any combination thereof.

13. The system of claim 8, wherein said at least one base further comprises a tilt mechanism configured for translating said movement in said vertical dimension of said at least one fluid-holding container into said pivotable motion of said at least one solar panel about said pivot point; further wherein said tilt mechanism is configured for tilting said at least one solar panel between 25° and 75° to either side relative to the horizontal; further wherein said tilt mechanism is configured such that a center of gravity of said solar panel is located below or on said pivot point.

14. The system of claim 13, wherein said tilt mechanism comprises at least one mechanism selected from a group consisting of (a) a cable-and-pully tilt mechanism comprising: (i) at least one first cable coupled to the upper portion of said at least one fluid-holding container; (ii) at least one second cable coupled to the bottom portion of said at least one fluid-holding container; said at least one first cable and said at least one second cable are coupled to said at least one solar panel at two opposing ends thereof, such that said vertical movement of said at least one fluid-holding container exerts pulling forces on at least one selected from a group consisting of at least one first cable, at least one second cable and any combination thereof to result in pivoting movement of said at least one solar panel; (b) a crank-like tilt mechanism, (c) an arcuate slot tilt mechanism, comprising: at least one support frame in communication with said at least one solar panel, comprising one or more brackets having an arcuate guide slot wherein said at least one fluid-holding container is in communication with at least one guide pin fitted within said guide slot; such that said movement in said vertical dimension of at least one fluid-holding container is thus translated into angular movement of said support frame and said at least one solar panel; (d) a parallelogram with an underwater symmetrical frame, (e) a parallelogram with an underwater asymmetrical frame and push/pull rods and any combination thereof.

15. The system of any of claims 8-14, further comprising a control unit in fluid communication with said at least one fluid-holding container, wherein the control unit is configured for selectively adjusting a fluid level within said at least one fluid-holding container;

and wherein said module further comprising at least one pipe connected between said control unit and said at least one fluid-holding container.

16. The system of claim 12, wherein at least one of (a) said at least one solar panel is further configured for tilting in unison; (b) said framework further comprises one or more lines configured for mooring said system; (c) said one or more lines are further configured for facilitating adjustment of an azimuth angle of said system; (d) said system additionally comprising at least one pump in a closed fluid filling/emptying system, wherein fluid may be transferred from said at least one fluid-holding container to another; and (e) any combination thereof.

17. The system of claim 8, additionally comprising at least one selected from a group consisting of (a) at least one line extending outwardly from said framework to reach at least one selected from a group consisting onshore anchor points, a mooring buoy, mooring and anchoring system and any combination thereof; b) at least one horizontal 'yo-yo'-like mooring and anchoring arrangement, comprising two or more lines wrap around said framework in opposing directions, so as to facilitate rotational positioning of said framework, such that, when rotational force applied to said framework will result in loosening at least one of said two or more lines while building tension in a second line; and (c) any combination thereof.

18. The system of claim 8, wherein a speed of a vertical movement, considering a changing weight of said at least one fluid-holding container, is depicted by the following equation:

$$v_v = \frac{\Delta Z}{t} = \frac{\Delta Z}{\left(\Delta V - \frac{\Delta M}{\rho_w}\right)/FlowRate}$$

$$= \frac{Z_2 - Z_1}{\left(V_2 - V_1 - \frac{M_2 - M_1}{\rho_w}\right)/FlowRate} \left[\frac{cm}{\left(cm^3 - \frac{kg}{kg/cm^3}\right)/\frac{cm^3}{sec}}\right]$$

where M1, M2 are the masses of the portions of said at least one fluid-holding container above fluid level, at the first location point 1 and the second location point 2, and pw is the density of the fluid.

19. The system of claim 8, additionally comprising at least one force dampening mechanism, comprising at least one additional container, said at least one additional container is coupled to said framework, said at least one additional container comprises one or more

apertures, configured to provide fluid communication between said at least one additional container and the body of water.

20. A method comprising:

(a) providing the system according to any one of claims 8-19;

(b) rigidly interconnecting at least two bases of said at least one modules in a specified arrangement;

(c) fluidly connecting said control unit with said at least fluid-holding container, wherein the control unit is configured for selectively adjusting a fluid level within said at least one fluid-holding container; and

(d) deploying said system in said body of water.

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