CLAIMS:

1. A wave energy converter (WEC), including a body portion and at least one flexible membrane providing one or more respective WEC cells, each cell bounding at least part of a volume of a fluid, the at least one flexible membrane submerged when in use, a substantial portion of the at least one membrane inclined from vertical and inclined from horizontal providing a flow smoothed way for wave energy to travel over the submerged WEC whilst pressure ~~deforming~~ deforms the at least one membrane towards the body to compress the volume of the fluid, the inclination of the substantial portion of the at least one membrane from vertical and horizontal assisting coupling conversion of potential and kinetic energy of the wave to pressure within the fluid.

~~2. A wave energy converter (WEC), including a body portion and at least one flexible membrane forming at least part of at least one cell volume for pressurised fluid, the at least one membrane inclined from a lower portion to an upper portion thereof to allow a wave impinging on the WEC to flow over the at least one membrane and forces from surge and heave of the wave to deform the at least one membrane towards the body to compress the fluid in the at least one volume.~~

~~3. A WEC according to claim 1 or 2, including at least one port, wherein, when wave pressure higher than pressure of fluid within a cell volume impinging against the membrane causes deformation of the membrane, the pressurised fluid is forced out of the cell via the at least one port.~~

~~4. A WEC according to claim 3, wherein the at least one port is at or adjacent an upper rearward portion of the respective cell.~~

~~5. A WEC according to any one of the preceding claims, wherein the body includes at least one respective face that opposes a said respective at least one membrane and towards which the membrane is deformed by the wave force.~~

~~6. A WEC according to claim 1 or 2 where the lower portion is forward and the upper portion is rearward.~~

~~7. A WEC according to claim 1 or 2 where the body portion and the at least one membrane incline upward and rearward from the lower portion to the upper portion.~~

~~8. A WEC according to any one of the preceding claims, wherein the pressurised fluid within the cell is air or other gaseous fluid.~~

~~9~~2. A WEC according to ~~any one of the preceding claims~~claim 1, including multiple said cells arranged in an array forming a multiple cell said wave energy convertor.

~~10~~3. A WEC according to claim ~~9~~1 or 2, wherein the cells are rigidly attached to one another to form ~~a~~ the multiple cell WEC.

~~11. A WEC according to claim 5, wherein one or more of the at least one face is formed by casting or moulding as part of the body or is formed on a rigid or semi rigid face member to attach to the body to form a desired face profile.~~

~~12. A WEC according to claim 5 or 11, wherein the membrane is attachable to the face member as part of a unit mountable to the converter.~~

~~13. A WEC according to claim 5 or 11, wherein the at least one face is cast into the body.~~

~~14. A WEC according to any one of the preceding claims, wherein the at least one membrane is removably attachable to the body.~~

~~15.A WEC according to any one of the preceding claims, wherein the or each membrane takes on a convex shape once inflated by sufficient interior pressure within the respective cell overcoming exterior pressure.~~

~~16.A WEC according to claim 15, wherein the convex shape inclines at an angle to horizontal and vertical.~~

~~17.A WEC according to any one of the preceding claims, wherein a forward most portion of the respective cell is below a rearward most portion of that cell such that the cell inclines upwards from the front to the rear thereof.~~

~~18~~4. A WEC according to ~~claim 10 or 11~~any one of the preceding claims, wherein the at least one ~~cell~~ membrane is inclined between ~~0~~20° and ~~90~~70° from horizontal.

~~19~~5. A WEC according to ~~claim 18~~any one of the preceding claims, wherein the substantial portion of the at least one cell ~~is inclined~~ inclines~~between 20° and 60°~~ from horizontal with respect to a said wave passing over the WEC or declines from horizontal with respect to said wave passing over the WEC.

~~20~~6. A WEC~~D~~ according to any one of the preceding claims, the wave energy converter ~~including~~ includes the at least one said cell tethered, ~~anchorage~~ anchored or ~~attachment~~ attached to ~~the~~ a seabed or otherwise restrained to restrict the vertical movement of the WEC as the wave passes over the WEC.

7. A WEC according to claim 6, the at least one cell spaced above the seabed and tethered, anchored or attached thereto or otherwise restrained to restrict the vertical movement of the WEC as the wave passes over the WEC.

8. A WEC according to claim 6 or 7, wherein the cell(s) of the WEC is/are deployed at between 2.5m and 15m of water depth on average.

~~21. A WEC according to any one of the preceding claims, provided as a near shore submerged, pneumatic, attenuation type WEC or as an offshore submersed deep water WEC or as a breakwater WEC.~~

~~22~~9. A WEC according to any one of the preceding claims, further including a rear of the ~~converter~~ WEC including an exterior ~~fluid~~ wave flow control, straight, curved or rounded portion.

~~23~~10. A WEC according to any one of the preceding claims, wherein multiple said cells are arranged as one or more linear, curved or circular arrays of said cells.

11. A WEC according to any one of the preceding claims, wherein multiple said cells of the WEC are arranged horizontally with respect to one another.

~~24. A WEC according to claim 23, wherein two linear arrays are connected to form a V or chevron arrangement.~~

~~25~~12. A WEC according to claim ~~24~~11, deployed as multiple linear or curved arrays of said cells arranged in at least one~~wherein an apex of the~~ V or chevron ~~is~~ orientated, in use, towards or to face the direction of the oncoming waves or the open sea/ocean and the linear or curved ~~arms or legs~~arrays of the V or chevron extend from the apex towards the shore such that the waves approach the apex first and the V or chevron and each ~~arm/leg~~array obliquely, or deployed~~.~~

~~26. A WEC according to claim 24, wherein~~ such that an apex of the V or chevron arrangement points towards the shore and away from the waves, such that the ~~arms or legs~~linear or curved arrays of the V project away from the apex towards open water.

~~27. A WEC according to any one of claims 25 or 26, wherein an included angle of the V or chevron is substantially or approximately between 45° and 175°.~~

~~28.A WEC according to claim 27, wherein the included angle is be between 60° and 120°.~~

~~29.. A WEC according to claim 25, configured in an open curve or arc arranged to be orientated either with an open side towards shore or with the open side towards open water.~~

~~30.A WEC according to any one of the preceding claims, configured as a submersible WEC.~~

~~31.A WEC according to any one of the preceding claims, including a circular or annular configuration of said cells to accept omnidirectional wave spectra.~~

~~32.A WEC according to any one of the preceding claims, wherein, during initial compression of the membrane in use, an intermediate profile of an elongated S when viewed in side profile is formed in the membrane as the wave pressure depresses firstly the forward lower portion of the membrane which squeezes fluid within the cell volume towards the at least one port of the cell higher up.~~

~~33.A WEC according to any one of the preceding claims, wherein effective width of the membrane matches the effective width of the cell face.~~

~~34.A WEC according to any one of the preceding claims, wherein at least one port associated with each cell is located adjacent an upper portion of the cell to communicate the fluid from the cell to at least one check valve(s) or bidirectional turbine thereby enabling the cell to maximise sweep of its volume by compression of the membrane by the wave pressure on the deflation stroke.~~

~~35.A WEC according to claim 23, 24 or 25, wherein a longitudinal extent of each linear array is equal to an average wavelength of predominate energy waves in a particular location~~

~~36. A WEC according to claim 28, wherein the or each linear array is between 40m and to 80m long.~~

13. A WEC according to any one of the preceding claims, wherein, for at least one array of said cells, at least two said membranes are spaced so as to couple to different parts of a wavelength of the wave.

14. A WEC according to claim 13, the membrane of at least one said cell is exposed to higher wave pressure, and the membrane of at least another said cell is exposed to lower wave pressure as wave pass over the cell.

~~37~~15. A WEC according to any one of claims ~~23, 24, 25, 35 or 36~~13 or 14, wherein the array is arranged such that when one cell is ~~under~~ exposed to ~~the peak~~ higher wave pressure ~~of a wave~~ and pumping fluid out from the cell via ~~the~~ at least one port, another cell is ~~under minimum~~ exposed to lower wave pressure ~~of a wave~~ and accepting return fluid from a reservoir or low pressure manifold via that cell's at least one port.

~~38. A WEC according to any one of the preceding claims, further including a control system arranged to raise or lower average pressure in each said cell and/or within a low pressure or high pressure manifold of the system.~~

~~39. A WEC according to claim 38, wherein the control system includes a pneumatic system to maintain optimum cell pressure as the water depth changes with tidal or other longer term effects and depending on the optimal conditions for the prevailing or current sea state.~~

~~40~~16. A WEC according to any one of the preceding claims, further including one or more cell lower pressure inlet ports, one or more cell higher pressure outlet ports, one or more manifolds for combining or splitting fluid flow respectively to or from said cells, one or more turbines driven by the pressure flow from the cell(s)~~, the one or more turbines driving one or more electrical generators~~.

~~41~~17. A WEC according to claim ~~40~~12, wherein, when multiple said cells are arranged in at least one array, at least one turbine and/or electrical generator is mounted toward or at the end of the or each said array or anywhere along a length of a said array, or wherein, when multiple said cells are arranged in a V or chevron of multiple arrays of the cells, the turbine(s) and/or electrical generator(s) is/are mounted adjacent to or in an apex of the V or chevron ~~so that~~ and airflow streams from each ~~arm/leg~~array are combined.

~~42. A WEC according to claim 40, wherein when multiple said cells are arranged in a V or chevron, the turbine(s) and electrical generator(s) are mounted towards or at the end of each leg/arm thereof or anywhere along the leg/arm length.~~

18. A WEC according to claim 16 or 17, including a fluid flow control system having at least one check valve or at least one turbine, or a combination of at least one check valve and at least one turbine, provided at or adjacent a port of a respective cell, or provided in one or more conduits, optionally in either or both a low pressure and a high pressure conduit.

~~43. A WEC according to any one of the preceding claims, wherein converter includes at least one pump powered from one or more turbines driven by the flow of pressurised fluid from the cell(s).~~

~~44. A WEC according to any one of the preceding claims, provided as a kit of parts.~~

~~45. A WEC according to any one of the preceding claims, wherein the body is formed of precast concrete.~~

~~46. A WEC according to claim 43 or 44 or 45, wherein at least a portion of the respective cell is formed integrally with the body.~~

~~47. A WEC according to claim 5 or 11, wherein one or more of the faces includes an opening to receive at least one replaceable valve or bi-directional turbine.~~

~~48. A WEC according to any one of the preceding claims, a multi-curved, convex, concave or straight rear or rear face.~~

~~49~~19. A WEC according to any one of the preceding claims, including multiple said cells with at least one said cell on each of opposing sides of the WEC, at least one said cell on a first side with respect to the wave to extract energy from ~~a~~ the wave, and at least one other said cell to extract energy from the same wave and/or from a returning said wave.

~~50. A WEC according to any one of the preceding claims, wherein the membrane is attached to or adjacent upper and lower portions of the converter body.~~

~~51. A WEC according to any one of the preceding claims, wherein the membrane at one or more ends of the WEC respectively forms a curve, semicircle, arc or spline.~~

20. A WEC according to any one of the preceding claims, including a longitudinal array of the cells arranged such that an angle that the waves impinge on the array is between 10° and 80°.

~~52~~21. A WEC according to ~~claim 51~~any one of the preceding claims, wherein the membrane at ~~the~~ a respective end of the WEC~~utilises either elastomeric properties or~~ is geometrically shaped such that the elastomeric strain / stress is reduced.

22. A WEC according to any one of the preceding claims, wherein the membrane at one or more ends of the WEC respectively forms a curve, semicircle, arc or spline.

23. A WEC according to any one of the preceding claims, wherein, at least one said membrane has chord dimensions allowing the respective membrane to conform to a face of the respective cell when deflated.

~~53. A wave energy conversion system including a WEC according to any one of claims 1 to 52, and electrical power generation equipment mounted thereon or adjacent thereto.~~

~~54. A method of controlling or optimising fluid pressure within a wave energy convertor (WEC) system, the method including increasing or reducing fluid pressure within at least one cell and/or within a low pressure or high pressure conduit(s) and/or within at least one manifold of the system.~~

~~55. The method according to claim 54, including increasing or decreasing the fluid pressure relative to at least one reference pressure value.~~

~~56. The method according to claim 55, whereby the or each reference pressure value is an average of fluid pressure determined within the or each respective said cell and/or within the low and/or high pressure conduit(s) and/or manifold of the system.~~

~~57. The method according to claim 56, whereby the average pressure is determined, at least in part, by averaging various pressures within a cell or across a number of cells of the WEC system at a particular time or across one or more cells over time.~~

~~58. The method according to claim 54, including controlling or optimising fluid pressure within the cell(s) to maintain optimum cell fluid pressure as a function of water depth changes with tidal or other effects.~~

~~59. The method according to claim 58, whereby fluid pressure within the cell(s) is increased with an increase in water depth to balance the increased external~~

~~pressure from the water, and as water depth decreases, fluid pressure within the cell(s) is decreased to balance the decreased pressure from the water.~~

~~60. The method according to claim 54, in the event of actual or predicted deterioration in sea conditions, reducing fluid pressure within the cell(s) to prevent damage to the membrane.~~24. A method of controlling or optimising fluid pressure within a wave energy convertor (WEC) system having a control system, the method including increasing or reducing fluid pressure within at least one cell and/or within a low pressure or high pressure conduit(s) and/or within at least one manifold of the system.

25. The method according to claim 24, including increasing or decreasing the fluid pressure relative to at least one reference pressure value.

26. The method according to claim 25, whereby the or each fluid pressure is an average of fluid pressure determined within the or each respective said cell and/or within the low and/or high pressure conduit(s) and/or manifold of the system.

27. The method according to claim 26, whereby the average pressure is determined, at least in part, by averaging various pressures within a cell or across a number of cells of the WEC system at a particular time or across one or more said cells over time.

28. The method according to any one of claims 24 to 27, including controlling or optimising fluid pressure within the cell(s) to maintain optimum cell fluid pressure as a function of water depth changes with tidal or other effects.

29. The method according to claim 28, whereby fluid pressure within the cell(s) is increased with an increase in water depth to balance the increased external pressure from the water, and as water depth decreases, fluid pressure within the cell(s) is decreased to balance the decreased pressure from the water.

30. The method according to claim 28 or 29, in the event of actual or predicted deterioration in sea conditions, reducing the fluid pressure within the cell(s) to prevent damage to the respective membrane(s).

CLAIMS:

1. A wave energy converter (WEC), including a body portion and at least one flexible membrane providing one or more respective WEC cells, each cell bounding at least part of a volume of a fluid, the at least one flexible membrane submerged when in use, a substantial portion of the at least one membrane inclined from vertical and inclined from horizontal providing a flow smoothed way for wave energy to travel over the submerged WEC whilst pressure deforms the at least one membrane towards the body to compress the volume of the fluid, the inclination of the substantial portion of the at least one membrane from vertical and horizontal assisting coupling conversion of potential and kinetic energy of the wave to pressure within the fluid.

2. A WEC according to claim 1, including multiple said cells arranged in an array forming a multiple cell said wave energy convertor.

3. A WEC according to claim 1 or 2, wherein the cells are rigidly attached to one another to form the multiple cell WEC.

4. A WEC according to any one of the preceding claims, wherein the at least one membrane is inclined between 20° and 70° from horizontal.

5. A WEC according to any one of the preceding claims, wherein the substantial portion of the at least one cell inclines from horizontal with respect to a said wave passing over the WEC or declines from horizontal with respect to said wave passing over the WEC.

6. A WEC according to any one of the preceding claims, the wave energy converter includes the at least one said cell tethered, anchored or attached to a seabed or otherwise restrained to restrict the vertical movement of the WEC as the wave passes over the WEC.

7. A WEC according to claim 6, the at least one cell spaced above the seabed and tethered, anchored or attached thereto or otherwise restrained to restrict the vertical movement of the WEC as the wave passes over the WEC.

8. A WEC according to claim 6 or 7, wherein the cell(s) of the WEC is/are deployed at between 2.5m and 15m of water depth on average.

9. A WEC according to any one of the preceding claims, further including a rear of the WEC including an exterior wave flow control, straight, curved or rounded portion.

10. A WEC according to any one of the preceding claims, wherein multiple said cells are arranged as one or more linear, curved or circular arrays of said cells.

11. A WEC according to any one of the preceding claims, wherein multiple said cells of the WEC are arranged horizontally with respect to one another.

12. A WEC according to claim 11, deployed as multiple linear or curved arrays of said cells arranged in at least one V or chevron orientated, in use, towards or to face the direction of the oncoming waves or the open sea/ocean and the linear or curved arrays of the V or chevron extend from the apex towards the shore such that the waves approach the apex first and the V or chevron and each array obliquely, or deployed such that an apex of the V or chevron arrangement points towards the shore and away from the waves, such that the linear or curved arrays of the V project away from the apex towards open water.

13. A WEC according to any one of the preceding claims, wherein, for at least one array of said cells, at least two said membranes are spaced so as to couple to different parts of a wavelength of the wave.

14. A WEC according to claim 13, the membrane of at least one said cell is exposed to higher wave pressure, and the membrane of at least another said cell is exposed to lower wave pressure as wave pass over the cell.

15. A WEC according to any one of claims 13 or 14, wherein the array is arranged such that when one cell is exposed to higher wave pressure and pumping fluid out from the cell via at least one port, another cell is exposed to lower wave pressure and accepting return fluid from a reservoir or low pressure manifold via that cell's at least one port.

16. A WEC according to any one of the preceding claims, further including one or more cell lower pressure inlet ports, one or more cell higher pressure outlet ports, one or more manifolds for combining or splitting fluid flow respectively to or from said cells, one or more turbines driven by the pressure flow from the cell(s).

17. A WEC according to claim 12, wherein, when multiple said cells are arranged in at least one array, at least one turbine and/or electrical generator is mounted toward or at the end of the or each said array or anywhere along a length of a said array, or wherein, when multiple said cells are arranged in a V or chevron of multiple arrays of the cells, the turbine(s) and/or electrical generator(s) is/are mounted adjacent to or in an apex of the V or chevron and airflow streams from each array are combined.

18. A WEC according to claim 16 or 17, including a fluid flow control system having at least one check valve or at least one turbine, or a combination of at least one check valve and at least one turbine, provided at or adjacent a port of a respective cell, or provided in one or more conduits, optionally in either or both a low pressure and a high pressure conduit.

19. A WEC according to any one of the preceding claims, including multiple said cells with at least one said cell on each of opposing sides of the WEC, at least one said cell on a first side with respect to the wave to extract energy from the

wave, and at least one other said cell to extract energy from the same wave and/or from a returning said wave.

20. A WEC according to any one of the preceding claims, including a longitudinal array of the cells arranged such that an angle that the waves impinge on the array is between 10° and 80°.

21. A WEC according to any one of the preceding claims, wherein the membrane at a respective end of the WEC is geometrically shaped such that the elastomeric strain / stress is reduced.

22. A WEC according to any one of the preceding claims, wherein the membrane at one or more ends of the WEC respectively forms a curve, semicircle, arc or spline.

23. A WEC according to any one of the preceding claims, wherein, at least one said membrane has chord dimensions allowing the respective membrane to conform to a face of the respective cell when deflated.

24. A method of controlling or optimising fluid pressure within a wave energy convertor (WEC) system having a control system, the method including increasing or reducing fluid pressure within at least one cell and/or within a low pressure or high pressure conduit(s) and/or within at least one manifold of the system.

25. The method according to claim 24, including increasing or decreasing the fluid pressure relative to at least one reference pressure value.

26. The method according to claim 25, whereby the or each fluid pressure is an average of fluid pressure determined within the or each respective said cell and/or within the low and/or high pressure conduit(s) and/or manifold of the system.

27. The method according to claim 26, whereby the average pressure is determined, at least in part, by averaging various pressures within a cell or across a number of cells of the WEC system at a particular time or across one or more said cells over time.

28. The method according to any one of claims 24 to 27, including controlling or optimising fluid pressure within the cell(s) to maintain optimum cell fluid pressure as a function of water depth changes with tidal or other effects.

29. The method according to claim 28, whereby fluid pressure within the cell(s) is increased with an increase in water depth to balance the increased external pressure from the water, and as water depth decreases, fluid pressure within the cell(s) is decreased to balance the decreased pressure from the water.

30. The method according to claim 28 or 29, in the event of actual or predicted deterioration in sea conditions, reducing the fluid pressure within the cell(s) to prevent damage to the respective membrane(s).