CLAIMS

1. A system for generating energy from a current flowing in a body of water, the system comprising:

a plurality of generator assemblies, each generator assembly comprising a generator and operable to generate energy in response to the flow of the current; wherein each generator assembly has a specific orientation relative to the orientation of the flow of the incident current, and

a ~~fixture~~ subsea wellhead assembly for securing the system at the bed of the body of water; and

a retaining means attaching the generator assembly directly to the ~~fixture~~ wellhead assembly, the generator assembly being held between the bed of the body of water and the surface of the body of water, and the generator assembly being rotatable about a substantially vertical axis with respect to the ~~fixture~~ wellhead assembly, wherein the retaining means provides a flexible connection between the generator assembly and the wellhead assembly and wherein the generator assemblies are arranged in a line extending substantially vertically above the wellhead assembly and the retaining means.

~~2. The system according to claim 1, wherein the generator assembly has a specific orientation relative to the orientation of the flow of the incident current.~~

~~3~~2. The system according to ~~either of~~ claim~~s~~ 1 ~~or 2~~, wherein the generator is operable to generate electricity.

~~4~~3. The system according to ~~either of~~ claim~~s~~ 1 ~~or 2~~, wherein the generator is a pump operable to generate a pressurised fluid.

~~5~~4. The system according to any preceding claim, wherein the generator assembly comprises a turbine.

~~6~~5. The system according to claim ~~5~~4, wherein the turbine comprises one or a plurality of impellors.

~~7~~6. The system according to claim ~~6~~5, wherein the turbine comprises a plurality of impellors, the swept volume of the impellors overlapping.

~~8~~7. The system according to claim ~~6 5~~ or ~~7~~6, wherein the turbine comprises a plurality of impellors, one or more impellors arranged to rotate in a first direction and one or more impellors arranged to rotate in a second direction, opposite to the first.

~~9~~8. The system according to claim ~~6~~5, wherein the turbine comprises a single impellor and means are provided to prevent the generator assembly rotating out of alignment with the incident current.

~~10~~9. The system according to any of claims ~~6 5~~ to ~~9~~8, wherein the one or plurality of impellors are arranged to rotate about a substantially horizontal axis.

~~11~~10. The system according to any of claims ~~6 5~~ to ~~9~~8, wherein the one or plurality of impellors are arranged to rotate about a substantially vertical axis.

~~12. The system according to any preceding claim, wherein the fixture assembly is a subsea installation.~~

~~13. The system according to claim 12, wherein the subsea installation is for the production of oil and/or gas.~~

~~14. The system according to claim 13, wherein the subsea installation is a wellhead assembly.~~

~~15. The system according to any preceding claim, wherein the retaining means provides a rigid connection between the generator assembly and the fixture assembly.~~

~~16. The system according to any of claims 1 to 14, wherein the retaining means provides a flexible connection between the generator assembly and the fixture assembly.~~

~~17~~11. The system according to any preceding claim ~~16~~, wherein the retaining means comprises a tubular assembly.

~~18. The system according to any preceding claim, comprising a plurality of generator assemblies.~~

~~19. The system according to claim 18, wherein the generator assemblies are arranged in a line extending substantially vertically above the fixture assembly and the retaining means.~~

~~20~~12. The system according to any preceding claim ~~19~~, wherein each generator assembly is connected to each adjacent assembly by a connection allowing the generator assemblies to rotate independently of one another about a substantially vertical axis.

~~21~~13. The system according to any preceding claim ~~19~~, wherein the generator assemblies are arranged in groups, each group comprising a plurality of generator assemblies, each group of generator assemblies being connected to each adjacent group of assemblies by a connection allowing the

group of generator assemblies to rotate independently of one another about a substantially vertical axis.

~~22~~14. The system according to any preceding claim, wherein the connection between the retaining means and the generator assembly allows the generator assembly to rotate about a substantially vertical axis with respect to the retaining means.

~~23~~15. The system according to any preceding claim, wherein the retaining means is connected to the ~~fixture~~ wellhead assembly so as to be able to rotate about a substantially vertical axis with respect to the ~~fixture~~ wellhead assembly.

~~24~~16. The system according to any preceding claim, further comprising means to locate the generator assembly at the requisite depth and position relative to the ~~fixture~~ wellhead assembly.

~~25~~17. The system according to claim ~~24~~16, wherein the said means comprises means providing buoyancy.

~~26~~18. The system according to claim ~~25~~17, wherein the means providing buoyancy is a buoyant body.

~~27~~19. The system according to claim ~~25~~ 17 or ~~26~~18, wherein the means providing buoyancy is one or more buoyant members or components of the generator assembly.

~~28~~20. The system according to any of claims ~~25~~ 17 to ~~27~~19, wherein means providing buoyancy are disposed at the portion of the system distal from the ~~fixture~~ wellhead assembly.

~~29~~21. The system according to any preceding claim, wherein the generator assembly is free to rotate about the vertical axis under the action of the incident current.

~~30~~22. The system according to claim ~~29~~21, wherein the generator assembly is provided with a vane portion having one or more surfaces arranged to be acted upon by the incident current and orient the generator assembly with respect to the current.

~~31~~23. A system for generating energy from a current in a body of water, such as an ocean, the system comprising:

an array of generator assemblies, each generator assembly comprising a generator and operable to generate energy in response to the flow of the current;

a fixture assembly on the bed of the body of water; and

a retaining means for attaching the array of generator assemblies directly to the fixture assembly, the generator assemblies being held between the bed and the surface of the body of water;

generator assemblies within the array extending in a vertical pattern from the fixture assembly.

~~32~~24. The system according to claim ~~31~~23, wherein each generator assembly has a specific orientation relative to the orientation of the flow of the incident current.

~~33~~25. The system according to either of claims ~~31~~ 23 or ~~32~~24, wherein the generators are operable to generate electricity.

~~34~~26. The system according to either of claims ~~31~~ 23 or ~~32~~25, wherein the generators comprise a pump operable to generate a pressurised fluid.

~~35~~27. The system according to any of claims ~~31~~ 23 to ~~34~~26, wherein each generator assembly comprises a turbine.

~~36~~28. The system according to claim ~~35~~27, wherein the turbine comprises one or a plurality of impellors.

~~37~~29. The system according to claim ~~36~~28, wherein the turbine comprises a plurality of impellors, the swept volume of the impellors overlapping.

~~38~~30. The system according to claim ~~36~~ 27 or ~~37~~29, wherein the turbine comprises a plurality of impellors, one or more impellors arranged to rotate in a first direction and one or more impellors arranged to rotate in a second direction, opposite to the first.

~~39~~31. The system according to claim ~~36~~28, wherein the turbine comprises a single impellor and means are provided to prevent the generator assembly rotating out of alignment with the incident current.

~~40~~32. The system according to any of claims ~~36~~ 28 to ~~39~~31, wherein the one or plurality of impellors are arranged to rotate about a substantially horizontal axis.

~~41~~33. The system according to any of claims ~~36~~ 28 to ~~39~~31, wherein the one or plurality of impellors are arranged to rotate about a substantially vertical axis.

~~42~~34. The system according to any of claims ~~31~~ 23 to ~~41~~33, wherein the fixture assembly is a subsea installation.

~~43~~35. The system according to claim ~~42~~34, wherein the subsea installation is for the production of oil and/or gas.

~~44~~36. The system according to claim ~~43~~35, wherein the subsea installation is a wellhead assembly.

~~45~~37. The system according to any of claims ~~31~~ 23 to ~~44~~36, wherein the retaining means provides a rigid connection between the generator assembly and the fixture assembly.

~~46~~38. The system according to any of claims ~~31~~ 23 to ~~44~~36, wherein the retaining means provides a flexible connection between the generator assembly and the fixture assembly.

~~47~~39. The system according to claim ~~46~~38, wherein the retaining means comprises a tubular assembly.

~~48~~40. The system according to any of claims ~~31~~ 23 to ~~47~~39, wherein the generator assemblies are arranged in a line extending substantially vertically above the fixture assembly and the retaining means.

~~49~~41. The system according to claim ~~48~~40, wherein each generator assembly is connected to each adjacent assembly by a connection allowing the generator assemblies to rotate independently of one another about a substantially vertical axis.

~~50~~42. The system according to claim ~~48~~40, wherein the generator assemblies are arranged in groups, each group comprising a plurality of generator assemblies, each group of generator assemblies being connected to each adjacent group of assemblies by a connection allowing the group of generator assemblies to rotate independently of one another about a substantially vertical axis.

~~51~~43. The system according to any of claims ~~31~~ 23 to ~~50~~42, wherein the connection between the retaining means and the array of generator assemblies allows the generator assemblies to rotate about a substantially vertical axis with respect to the retaining means.

~~52~~44. The system according to any of claims ~~31~~ 23 to ~~51~~43, wherein the retaining means is connected to the anchor assembly so as to be able to rotate about a substantially vertical axis with respect to the fixture assembly.

~~53~~45. The system according to any of claims ~~31~~ 23 to ~~52~~44, further comprising means to locate the generator assembly at the requisite depth and position relative to the fixture assembly.

~~54~~46. The system according to claim ~~53~~45, wherein the said means comprises means providing buoyancy.

~~55~~47. The system according to claim ~~54~~46, wherein the means providing buoyancy is a buoyant body.

~~56~~48. The system according to claim ~~54~~ 46 or ~~55~~47, wherein the means providing buoyancy is one or more buoyant members or components of one or more generator assemblies.

~~57~~49. The system according to any of claims ~~54~~ 46 to ~~56~~48, wherein means providing buoyancy are disposed at the portion of the system distal from the fixture assembly.

~~58~~50. The system according to any of claims ~~31~~ 23 to ~~57~~49, wherein some or all of the generator assemblies are free to rotate about the vertical axis under the action of the incident current.

~~59~~51. The system according to claim ~~58~~50, wherein each such generator assembly is provided with a vane portion having one or more surfaces arranged to be acted upon by the incident current and orient the generator assembly with respect to the current.

~~60~~52. A system for generating energy from a current flowing in a body of water, such as an ocean, the system comprising:

a generator system comprising:

a generator assembly comprising a generator and operable to generate energy in response to the flow of the current;

a first retaining means for attaching the generator assembly directly to a first fixture assembly securing the generator assembly to the bed of the body of water, the generator assembly being held between the bed and the surface of the body of water; and

a locating assembly for holding the generator assembly in position with respect to the first fixture assembly, the locating assembly comprising:

a buoyant member;

a second retaining means extending between the buoyant member and a second fixture assembly on the bed of the body of water, the second fixture assembly being spaced from the first fixture assembly; and

a third retaining means extending between the second retaining means and the generator assembly.

~~61~~53. The system according to claim ~~60~~52, wherein the generator system is a system as defined in any of claims 1 to ~~60~~51.

~~62~~54. The system according to claim ~~60~~ 52 or ~~61~~53, wherein the second retaining means provides a flexible connection between the buoyant member and the second fixture assembly.

~~63~~55. The system according to claim ~~62~~54, wherein the second retaining means comprises a cable.

~~64~~56. The system according to any of claims ~~60~~ 52 to ~~63~~55, wherein the third retaining means comprises a cable.

~~65~~57. The system according to any of claim ~~60~~ 52 to ~~64~~56, wherein the third retaining means is connected to the uppermost end of the generator system.

~~66~~58. The system according to any of claims ~~60~~ 52 to ~~65~~57, comprising a plurality of locating assemblies.

~~67~~59. The system according to claim ~~66~~58, wherein a retaining means connects each locating assembly to an adjacent locating assembly.

~~68~~60. A subsea installation for the production of oil and/or gas comprising a system according to any preceding claim.

~~69~~61. The subsea installation according to claim ~~68~~60, comprising a wellhead.

~~70~~62. A generator assembly for use in generating energy from a flow of water, the assembly comprising:

a housing having a form such that, in use, the housing has an upstream orientation;

an impellor assembly located within the housing comprising a plurality of blades arranged to be contacted by the flow of water when in use; and

means to be acted upon by the flow of water to hold the housing in the upstream orientation.

~~71~~63. The generator assembly according to claim ~~70~~62, comprising a plurality of impellors, the swept volume of adjacent impellors overlapping.

~~72~~64. The generator assembly according to claim ~~70~~ 62 or ~~71~~63, comprising a plurality of impellors, one or more impellors arranged to rotate in a first direction and one or more impellors arranged to rotate in a second direction, opposite to the first.

~~73~~65. The generator assembly according to claim ~~70~~ 62 or ~~71~~63, comprising a single impellor and wherein the means to be acted upon by the flow of water when in use act to prevent the generator assembly rotating out of alignment with the incident current.

~~74~~66. The generator assembly according to any of claims ~~70~~ 62 to ~~73~~65, wherein the one or plurality of impellors are arranged to rotate about a substantially horizontal axis.

~~75~~67. The generator assembly according to any of claims ~~70~~ 62 to ~~73~~65, wherein the one or plurality of impellors are arranged to rotate about a substantially vertical axis.

~~76~~68. The generator assembly according to any of claims ~~70~~ 62 to ~~73~~65, wherein the means to be acted upon by the flow of water when in use act to orient the generator assembly with respect to the incident flow of water.

~~77~~69. The generator assembly according to any of claims ~~70~~ 62 to ~~76~~68, wherein the means to be acted upon by the flow of water comprise a vane.

~~78~~70. The generator assembly according to claim ~~77~~69, wherein the vane is integral with the housing.

~~79~~71. The generator assembly according to claim ~~78~~70, wherein the vane is formed by surfaces of the housing.

~~80~~72. The generator assembly according to claim ~~79~~71, wherein the vane is formed by surfaces of the housing extending downstream from the impellor assembly when the generator assembly is in use and properly aligned with the incident flow of water.

~~81~~73. A generator assembly for use in generating energy from a flow of water, the assembly comprising:

a housing; and

an impellor assembly located within the housing comprising a first impellor rotating in a first direction when in use and a second impellor rotating in a second direction opposite to the first when in use, the first and second impellors being arranged such that the volume of water swept by the blades of the first impellor overlaps with the volume of water swept by the blades of the second impellor.

~~82~~74. The generator assembly according to claim ~~81~~73, wherein one or more impellors are arranged to rotate in a first direction and one or more impellors are arranged to rotate in a second direction, opposite to the first.

~~83~~75. The generator assembly according to claim ~~81~~ 73 or ~~82~~74, wherein each impellor is arranged to rotate about a substantially horizontal axis.

~~84~~76. The generator assembly according to claim ~~81~~ 73 or ~~82~~74, wherein each impellor is arranged to rotate about a substantially vertical axis.

~~85~~77. The generator assembly according to any of claims ~~81~~ 73 to ~~84~~76, comprising two impellors arranged to extend in a line across the flow of water, when the assembly is in use and properly oriented.

~~86~~78. The generator assembly according to any of claims ~~81~~ 73 to ~~85~~77, further comprising a flow deflector disposed upstream of the region of overlap of the impellors so as to prevent water impinging directly on the said region of overlap.

~~87~~79. An impellor assembly comprising:

an elongate hub rotatable about an axis of rotation;

a plurality of elongate impellor blades extending along and radially outwards from the hub, each blade having an inner portion adjacent the hub and an outer portion distal from the shaft, adjacent blades defining a blade cavity therebetween;

wherein each impellor blade is fixed relative to the shaft and moveable therewith, the shaft and inner portions of the impellor blades being arranged such that fluid may be exchanged between the inner regions of the blade cavities.

~~88~~80. The impellor assembly according to claim ~~87~~79, wherein the inner portion of each blade is spaced from the shaft to form a cavity between the blade and the shaft, fluid being exchanged between the inner regions of the blade cavities through the said cavity.

~~89~~81. The impellor assembly according to claim ~~88~~80, wherein the impellor comprises a hub assembly comprising an inner hub and one or more plates extending radialy from the inner hub, the inner and the plates defining an annular cavity therebetween and radially inwards of the inner edges of the blades, each blade being mounted at its inner portion to the one or more plates, the plates being spaced apart to provide openings to allow the passage of a fluid into and out of the annular cavity.

~~90~~82. A generator assembly comprising an impellor assembly according to any of claims ~~87~~ 79 to ~~89~~81.

~~91~~83. A system for the generation of energy from the tidal flow of water, the system comprising:

a support assembly for retaining a generator assembly;

a generator assembly comprising:

an impellor assembly comprising a first impellor rotating about a vertical axis in a first direction when in use and a second impellor rotating about a vertical axis in a second direction opposite to the first when in use, the first and second impellors being arranged such that the volume of water swept by the blades of the first impellor overlaps with the volume of water swept by the blades of the second impellor.

~~92~~84. The system according to claim ~~91~~83, wherein the resistance of the impellors to rotation may be varied.

~~93~~85. The system according to claim ~~91~~ 83 or ~~92~~84, comprising a flow guide upstream of the region of overlap of the swept volumes to prevent incident water from impinging directly on blades in this region.

~~94~~86. The system according to claim ~~93~~85, comprising two said flow guides on opposing sides of the region of overlap of the swept volumes.

~~95~~87. The system according to any of claims ~~91~~ 83 to ~~94~~86, wherein the impellor assembly is according to any of claims ~~87~~ 79 to ~~89~~81.

~~96~~88. An installation comprising one or a plurality of systems according to any of claims ~~91~~ 83 to ~~95~~87.

~~97~~89. The installation according to claim ~~96~~88, further comprising a means to isolate the or each system from the flow of water.