CLAIMS

1. A ducted wind turbine comprising:-

at least a turbine rotor assembly adapted to extract kinetic energy from air flowing there past, the rotor assembly comprising a plurality of rotor blades having rotor tips at their outermost ends which define a rotor tip sweep circumference;

a duct assembly at least partially surrounding said rotor tip sweep circumference;

a base platform adapted to support the ducted wind turbine;

the duct assembly being mounted on the base platform by way of a weathervane bearing arrangement such that the duct assembly may weathervane around the turbine rotor assembly in response to changes in wind direction

a ducting channel being provided between a ducting inlet and a ducting outlet of the duct assembly, each of the ducting inlet and outlet having a longitudinal axis

and wherein the ducting inlet and outlet are arranged such that their respective longitudinal axes intersect with one another at a redirect angle α and wherein the plurality of turbine rotor blades in the turbine rotor assembly are assembled on sets of coaxial contrary rotating hubs such that at least a primary set of rotor blades rotating in one direction and at least a secondary set of rotor blades rotating in an opposite direction are provided.

2. A ducted wind turbine according to claim 1, wherein the base platform comprises a base platform for flotation on a body of water.

3. A ducted wind turbine according to claim 2, wherein the base platform comprises a semi-submersible base platform.

4. A ducted wind turbine according to any of claims 1 to 3, wherein the redirect angle α is between 90 to 170 degrees.

5. A ducted wind turbine according to any of claims 1 to 4, wherein a rotor plane area of a first set of rotor blades and a rotor plane area of a final set of rotor blades are substantially equal to one another in order to minimise compression or expansion of air flowing through the rotor assembly.

6. A ducted wind turbine according to any of claims 1 to 4, wherein the area of the ducting inlet is greater than the rotor plane area of the first set of rotor blades in order to create a ram effect on air passing through the rotor assembly.

7. A ducted wind turbine according to any of claims 1 to 4, wherein the area of the ducting inlet is lesser than the rotor plane area of a final set of rotor blades in order to create a diffuser effect on air passing through the rotor assembly.

8. A ducted wind turbine according to any of claims 1 to 7, wherein the ducting inlet and the ducting outlet each comprise a circular, ovoid or rectangular shaped area.

9. A ducted wind turbine according to any of claims 1 to 8, wherein the ducting channel comprises at least a guide vane arrangement adapted to guide air flow through the ducting channel and into the turbine rotor assembly.

10. A ducted wind turbine according to any preceding claim, wherein the inner surface of the ducting channel is aerodynamically optimised to facilitate smooth flow of air flow therethrough with minimal energy losses.

11. A ducted wind turbine according to any of claims 3 to 10 wherein the outer surface of the ducting channel is aerodynamically optimised to minimise structural loads and aerodynamic turbulence on the turbine and semi-submersible base platform while enhancing air flow and

promoting lower pressure across the ducting outlet and adding momentum to flow exhausted from the turbine outlet in order to aid the turbine mass air flow and energy capture.

12. A ducted wind turbine according to any preceding claim, wherein the wind turbine arrangement is provided with a vertical stabiliser tail, either integrated with or separated from yet connected to, the ducted wind turbine in order to facilitate said weathervane movement.

13. A ducted wind turbine according to claim 12, wherein the tail comprises steerable control surfaces and / or trim tabs.

14. A ducted wind turbine according to any of claims 3 to 13 wherein the semi-submersible base platform comprises a delta wing shaped arrangement having a plurality of discrete flotation members extending downwardly therefrom.

15. A ducted wind turbine according to claim 11, wherein the semi-submersible base platform comprises four discrete flotation members, one being provided at or toward each corner of the semi-submersible base platform such that a fore flotation member, an aft flotation member and two flanking flotation members are provided.

16. A ducted wind turbine according to either of claims 14 or 15, wherein each of the discrete flotation members comprises a lower float member attached to the semi-submersible platform by way of a support strut having a small hull cross sectional area at the water surface in order to maximise the stability of the support provided.

17. A ducted wind turbine according to any of claims 3 to 16, wherein the weathervane bearing arrangement comprises a substantially circular load bearing plate and a corresponding substantially circular recess provided between the wind turbine arrangement

and the semi-submersible base platform such that, in use, the duct assembly may weathervane around the turbine rotor assembly.

18. A ducted wind turbine according to claim 17, wherein the weathervane bearing arrangement is further provided with friction reducing means in order to facilitate loaded rotational movement of the duct assembly relative to the semi-submersible base platform in response to movements in the prevailing wind direction.

19. A ducted wind turbine according to any of claims 3 to 18, wherein a plurality of wave energy absorbers extend from an attachment point on the semi-submersible base platform to the water such that one end of each wave energy absorber is directly or indirectly supported by the base platform and the other end is supported by buoyant engagement with the water.

20. A ducted wind turbine arrangement according to claim 19, wherein said wave energy absorbers extend rearward from a trailing edge of the semi-submersible base platform on either side of the turbine arrangement.

21. A ducted wind turbine arrangement according to either of claims 19 or 20, wherein said attachment points of the wave energy absorbers are arranged progressively rearward on the semi-submersible platform such that, in use, a wave passing the wind turbine arrangement will progressively interact with the forwardmost to rearmost wave energy absorbers in succession.

22. A ducted wind turbine arrangement according to any of claims 19 to 21, wherein the wave energy absorbers are provided with an energy flotation module for buoyant interaction with the water.

23. A ducted wind turbine arrangement according to claim 22, wherein the energy flotation module comprises a substantially semi-spherical flotation member provided at a distal end of a structural arm of the wave energy absorber.

24. A ducted wind turbine arrangement according to claim 22, wherein the energy flotation module comprises a combined monocoque structural arm and flotation chamber.

25. A ducted wind turbine arrangement according to any of claims 19 to 24, wherein the wave energy absorbers are attached to the semi-submersible platform by way of a torsional bearing arrangement comprising a first rotatable member, a second rotatable member in rotatable communication with the first rotatable member, and torsional resistance means provided between the first and second rotatable members such that when at least one of the rotatable members is rotated relative to the other rotatable member a torsional resistance to such movement is created between said rotatable members.

26. A ducted wind turbine arrangement according to any of claims 3 to 25, further comprising at least a water turbine arrangement supported below the water surface by the semi-submersible platform.

27. A ducted wind turbine according to any preceding claim, further comprising a diffuser arrangement adapted to improve air flow through the turbine rotor assembly.