

ELECTRICITY GENERATION SYSTEM

The current application relates to an electricity generation system.

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The potential opportunity for sustainable marine energy technologies is enormous. Tidal hydrokinetic energy in particular, is a potentially unlimited renewable source for energy generation, due to its complete predictability and availability.

10 This vast resource enables tidal energy converting devices to help meet energy demands globally.

It is however a complicated technological challenge and is therefore a relatively late comer to the renewable energy market. The European Union and the United Kingdom were the first to recognize the potential and provided government funding for tidal energy development. The focus was on developing large scale 1MW systems to provide utility scale power.

20 However, this requires very large expensive turbines and installation structures and very fast tidal flows, ranging from 3m/s or above, for the systems to be viable. However, there are very few sites in the world that offer these flows and where available, are mostly located in deep ocean waters.

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WO 2016/145477 A1 discloses a rotor for an electricity generator.

It is an object of the present specification to provide an improved electrical energy generation system.

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A proposed electricity generation system comprises:
at least one electricity generation device being removably
fixed to a mounting device formed as a floating body or as a

fixed infrastructure by means of a retaining device, wherein the electricity generation device is bidirectionally symmetric and comprises a water turbine being functionally connected to a generator, wherein the generator comprises a helical gear-
5 box, wherein the generator is a permanent magnet synchronous motor, wherein the generator comprises an incremental encoder, wherein a rotation of the generator is monitorable by a signal generated from the incremental encoder, wherein electrical energy is conductable via a power line being guided from the
10 generator via an outside of the mounting device, wherein the electrical energy is conductable from the mounting device to a power station, wherein the nose and tail cones is coated by at least two layered bio fouling coatings, wherein blades of the turbine are sensitive to a bi-directional water flow, wherein
15 a power line entry point is arranged at a top of an enclosure, wherein the electricity generation device comprises a control panel, wherein the electricity generation system is functionally connectable to the web.

20 In this way, electrical energy can be generated through the water flow below the mounting device. The mounting device can be for example a bridge piers in a river or in a bay or a floating body attached thereto. By means of the helical gear, rotation speed between the turbine and the generator can be
25 matched, so that rotation speeds are attached properly. By means of the symmetrical design of the enclosure, electrical energy can be generated to consciously release both directions of the flow of the tide.

30 In one embodiment, the mounting device is a bridge or a floating body. In this way, the electrical energy system can be fixed both to a fixed infrastructure as well as to a movable object.

In further embodiments, the floating body is one of the following: barge, catamaran, mooring platform, existing fixed infrastructure, mobile platform, water craft.

- 5 In a further embodiment, the electricity generation device is mountable to a railing of the floating body. In this way, several electricity generation devices can detachably be fastened to the floating body.
- 10 According to yet a further embodiment, the electricity generation device is mountable to an opening located at a bottom of the floating body.

In yet a further embodiment, electrical energy of the electricity generation system is conductable via a power line being guided from the generator via an outside of the mounting device. A power line routing through a bottom of the floating body can be avoided in this way. For example, each power line from the turbines is directed to the top of the barge and into
20 the control panels.

In yet a further embodiment, a material of an enclosure of the proposed electricity generation device named the nacelle is manufactured in stainless steel (SS316L) and at least one of
25 the following for the nose and tail cone sections: fiberglass, fiber reinforced plastics.

In yet a further embodiment, a nacelle of the proposed electricity generation system does not require any additional
30 coating. This can reduce environmental impact.

In yet a further embodiment, the nose and tail cone is coated by at least two layered bio fouling coatings.

In yet a further embodiment, cathodic protection will be implemented by utilizing sacrificial anodes mounted on the turbine.

- 5 In yet a further embodiment, blades of the tidal turbine are sensitive to a bi-directional water flow. An optimized energy utilization is supported in this way.

10 In yet a further embodiment, a material of the blades comprises at least one of the following: Aluminum Alloy, Carbon Fiber, Glass reinforced plastics, composite materials, recycled plastic materials.

15 In yet a further embodiment, a power line entry point is arranged at a top of the enclosure. An improved and comfortable power line routing is supported in this way.

20 In yet a further embodiment, the electricity generation device comprises a control panel. A performance monitoring and control of the whole system is supported in this way.

25 In yet a further embodiment, the proposed electricity generation system is functionally connectable to the web. In this way a centralized operation of the system is supported.

The subject matter of the present specification will now be explained in more detail with respect to several figures, wherein:

30 Fig. 1 shows a side view of an embodiment of an electricity generation system,

Fig. 2 shows a top view of a further embodiment of an electricity generation system, and

Fig. 3 shows an exploded view of a further embodiment of an electricity generation device.

In the following description, specific features are provided to describe embodiments of the electricity generation system. It shall be apparent to a skilled person, however, that the embodiments may be practised without such specific features and/or other corresponding features.

It is noted that in the following description numerical values of embodiments are merely exemplary. Hence, a skilled person will use other numerical values for systems, devices, components, elements, diameters, materials, etc. without departing from the scope of the proposed electricity generation system.

Some parts of embodiments, which are shown in figures, may have similar parts. Similar parts may have same names or similar part numbers with a primary number and/or with a letter. The description of such similar parts also applies by reference to other similar parts, where appropriate, thereby reducing repetition of text without limiting the disclosure.

The small and versatile tidal turbine of the proposed electricity generation system supports multiple deployment options, such as e.g. below a bridge, on a mooring platform, existing fixed infrastructures, mobile platforms and water crafts, arranged in arrays, etc. The disclosed small scale tidal turbine can harness mechanical flow energy from low flow velocity resources, which are predominantly located in coastal waters and/or in remote island locations and in rivers of suitable depths and current speed.

By means of the proposed electricity generation system, a huge opportunity for smaller affordable devices is provided that can be operated in low tidal flow sites, which are usually found in coastal waters within approx. 10km of the shoreline.

5 Flow speeds in such sites range from approx. 0.6m/s to approx. 3m/s or higher. In this way there is provided renewable marine energy to end users in a plug-and-play operating system, covering a wide range of customizable products and services.

10 Proposed is an affordable small scale tidal turbine which may exploit marine energy, either deployed single or in arrays and detachably fixed to a mounting device, which may be built as a bridge, a floating body, or to an existing infrastructure, etc. In this way means to exploit a specific form of renewable
15 energy (hydrokinetic energy) to largely untapped non-utility markets, such as off-grid islands, fast streams under bridges, rivers, irrigation canals, after-flows in hydro dams, etc. is provided, all of those locations with flow rates from approx. 0.6m/s to approx. 3m/s.

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Fig. 1 shows a side view of a first embodiment of a proposed electricity generation system 100. The electricity generation system 100 comprises a mounting device 10 formed as a floating body, preferably formed as a barge, to which at least one
25 electricity generation unit 20, 20' is removably fixed, wherein each electricity generation device 20, 20' comprises a turbine with blades 21a...21n, 21a'...21n' and an enclosed generator 24, which may be driven by the turbine. In such way a tidal turbine is provided. Several electricity generation devices 20
30 may removably be fastened to a railing 11 of the floating body.

The blades 21a...21n, 21a'...21n' of the tidal turbine are sensitive to a bi-directional water flow. "Sensitive" in this context means that a rotation of the blades 21a...21n, 21a'...21n' can be caused by various water flow directions, in particular
5 by flow directions A and B. An optimized energy utilization is supported in this way.

One recognizes a streamlined, preferably symmetrical design, which can reduce water drag and thus enables incoming water to
10 rush past the electricity generation device 20 easily. An incoming water flow direction A, B is aligned with a longitudinal axis of the axial-flow tidal turbine. This is mainly because any change in angle of attack may reduce the power generation at design condition.

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The floating body may for example be formed as a boat, a catamaran, a floating platform, a mooring platform, water craft, etc. The mobile and transportable floating body can transport the attached tidal turbine to any site where a usable tide
20 with corresponding water flow is present. The tide may be used to drive the tidal turbine with the generator 24, thereby generating electricity.

The electricity generation devices 20, 20' are fixed to the
25 mounting device 10 by means of retaining elements 13, 13' which can also be used to lead power lines 15, 15' of the electricity generation devices 20, 20'. Power line entry points 27, 27' are arranged on top of enclosure 25, 25' of the electricity generation devices 20, 20'. By means of folding
30 devices 14, 14' each electricity generation device 20, 20' can separately be pulled in and pulled out from the mounting device 10. In this way the system 100 is operable also in the case that one of the electricity generation devices 20, 20' is missing due to exchange, service, repair, etc. In order to

conduct electric energy from the electricity generation system 100 to a remote power station 50, electrical current can separately be conducted via each power line 15, 15' or via a single power line 15, 15'.

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By means of a control panel 30, which can be connected to the web 40, an operation of the electricity generation system 100 can be controlled.

10 In an alternative arrangement, the mounting device 10 may be built as a fixed bridge or existing infrastructure in a jetty (not shown). In this way it is possible that at least one, preferably several electricity generation devices 20, 20' may be fastened to the fixed bridge, thereby exploiting a water
15 flow beneath the bridge for the purposes of generation of electricity.

In the above explained way there is provided a cost effective tidal turbine energy solution which is applicable for example
20 to conditions in South East Asia. South East Asia represents different tidal energy resources than those available for example in Europe or North America. The resources in South East Asia consist of slow to medium peak velocity tidal flows (from approx. 0.6m/s to approx. 3m/s) that are present in near-to-
25 shore and shallower sites.

Its tidal turbines are usable in these areas to convert hydrokinetic energy both in fast flowing streams and in low tidal flows at sea into electricity.

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In contrast thereto, larger tidal turbines (e.g. MW-scale per unit turbines) having been designed for high flows deployed in other regions of the world are therefore unfavorable in South East Asia, have had poor track records of failed deployments

and do most likely not achieve the required cost of energy to be viable in those sites.

The proposed electricity energy generation system 100 possesses various properties which are listed below merely exemplary:

- Simple to manufacture with a low number of elements to assemble

- Focus on unit turbines with electric power output from approx. 7kW to approx. 100kW, achieved in device sizes of approx. 1.5m to 5m in length and approx. 400kg to 1000kg in weight

- In-house software developed for control and system optimization, which supports Internet-of-Things

- Small compact design allows ease of installation on support structures

- Customizable for a placement of turbines on barges, platforms, bridges, wharfs, rivers, canal walls, water crafts etc. Larger scale units can also be deployed, e.g. on the sea bed

- Cost effective fabrication, assembly and logistics

- Cost savings in use near existing infrastructure and at sea, as there is no requirement for heavy-lift vessels for the purpose of transportation

- The tidal turbines of the proposed electricity generation system can achieve large electrical power output using a horizontal scale-out architecture of multiple tidal turbines in arrays

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- This is more cost-effective and mitigates the risk of unit failures as compared to scaling-up a single turbine to a much larger size

10 - Further cost savings may be attained by sharing a common electrical infrastructure, such as drives, inverters, power connections, etc.

The proposed electricity generation system 100 is able to produce clean renewable energy at sea and represents a turnkey solution for clean tidal energy supply to offshore islands, microgrids and the emerging blue economy. This includes e.g. design, construction, deployment, electrical connection, metering, operation, maintenance, etc.

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The proposed electricity generation system 100 comprises a mounting device 10 with several, preferably four to six 10kW tidal turbines being detachably fixed to the mounting device 10. A mounting device 10 built as a floating body may be formed as a barge or a catamaran or other kind of watercraft.

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In this way, also other possible designs of mounting devices 10 will enable a deployment of an increased number of tidal turbines. Electricity generated by the tidal turbines may initially be supplied to end users via marine power lines. Energy storage on the floating platform at sea and distribution to the local island grid may easily be implemented with the proposed electricity generation system 100.

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An operation of the electricity generation system 100 may be performed at least partially or fully autonomous and its performance may be remotely monitored on the mainland, e.g. via web-based tools. An end user receives thus a plug-and-play
5 electric energy station at sea which provides a complete solution for clean marine energy generation, storage and distribution.

Fig. 2 shows a top view of a further embodiment of the electricity generation system 100 with another removable mounting
10 option of the electricity generation devices 20, 20' at the mounting device 10 built as a floating body. One realizes that the electricity generation devices 20, 20' (shown with dotted lines) may be attached to openings 12, 12' in the bottom of
15 the floating body. In this way, numerous electricity generation devices 20 may removably be fixed to the floating body and may comfortably be submerged into and lifted out from the water, for example for the purposes of servicing, exchange, repair, etc.

20 Fig. 3 shows an embodiment of an electricity generation device 20 in more detail in an exploded view and highlights a sealed casing of the generator 24. Wake dynamics is closely linked to a design of a tail section 20b of the electricity generation
25 device 20. A design of the proposed tidal turbine design does not depend solely on the efficiency of a single tidal turbine but also on an interaction between several tidal turbines during operation.

30 An amount of electrical energy available for each tidal turbine strongly depends on energy fluxes from the flow passing the tidal turbine and the fluxes are affected by the flow to-

pology in the turbines' wakes. The tail section 20b is preferably designed keeping those aspects in mind to strive a smaller wake zone with less unsteady vortex sheddings.

5 The electricity generation device 20 comprises a mounting member 25a and two eye hooks (not shown) by means of which the electricity generation device 20 may be lifted to a transport means (e.g. truck, ship, airplane, etc.).

10 Fiberglass or fiber reinforced plastics may preferably be used as a choice of material of the nose and tail cones, preferably at least of the front section 20a and the tail section 20b of the electricity generation device 20. Said preferred materials are low-maintenance, and can comprise optionally a marine
15 coating as a base coating (not shown) and a gel-coating on the surface (not shown), in this way supporting a long service life. Regular cleaning such as washing off bio fouling and re-applying the gel-coating may help to maintain efficiency of flow of water and to drag forces to the blades 21a...21n.

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For a blade design, a key consideration includes a variation in a turning angle along blade length. At the blade root, the radial velocity is lower and thus requires larger turning angle. At the tip of the blades 21a...21n radial velocity and also
25 turning angle are at its maximum. This is to avoid any occurrence of mixing flow along the blade length to maximize the harnessing of energy available from incoming tides. The blades 21a...21n are preferably designed to capture tides in both flow directions A, B. In other words, the blades 21a...21n are sensi-
30 tive in a "bi-directional" way.

The blades 21a...21n of the proposed tidal turbine may be manufactured using preferably one of the following materials:

- Aluminum Alloy, which is tried and tested for turbine blades (wind turbines and hydro)

- Carbon Fiber, which is the normal choice for wind turbines

5 but is rather costly

- Glass Reinforced plastics (GRP)

Cheaper and/or other alternative materials to the above men-
10 tioned materials are also possible.

The blade hub 22, to which the blades 21a...21n are fastened, may e.g. be fabricated with two identical 3mm stainless steel (SS316L) circular plate reinforced with circular ribs and flat
15 bars of approx. 3mm thickness. An overall diameter of the blade hub 22 may preferably range from approx. 650mm to approx. 750mm, preferably approx. 700mm. The blade hub 22 is designed to withstand a thrust force of up to approx. 20kN on both directions of the blade hub 22. The blades 21a...21n may be
20 secured to the blade hub 22 e.g. with a specially designed Delrin material mounting. Delrin is not hydrophobic and does not impact the environment negatively.

A conceptual propeller tapered designed mounting implements a
25 mounting element 23 which is used to fix the tidal turbine rotor's shaft to the blade hub 22. A mechanical seal 26 is used to fix the mounting element 23 to a geared motor 24.

A perpendicular ring (not shown) of e.g. approx. 20 mm in
30 width is fabricated to a front circular plate of the blade hub 22 and may be used for a mounting of the front section 20a to the blade hub 22.

The enclosure 25 is foreseen to enclose the tidal turbine with the generator 24. The enclosure's flange mounted body may e.g. be fabricated with a schedule 10 stainless steel (SS316L) pipe of overall diameter of approx. 500 mm. The front of the enclosure 25 is preferably a standard blind flange of approx. 700 mm. The back of the enclosure 25 is extended with a schedule 10 stainless steel (SS316L) pipe of overall diameter of approx. 400 mm. The flange mounted geared generator 24 is sealed and protected within the enclosure 25 by means of a mechanical seal.

An electric power line (e.g. marine cable) entry point 27, 27' is realized preferably at the top of the enclosure body. A perpendicular ring of approx. 20 mm in width fabricated to the back of the turbine enclosure 25 is used for a mounting of the tail section 20b at the enclosure 25.

A material of the enclosure 25 can e.g. be a 316L stainless steel grade, wherein the generator 24 with its gear box are all sealed and protected in the enclosure 25 with such material. 316L stainless steel is a type of metallic alloy of stainless steel that is austenitic and contains nickel and molybdenum, which make the steel corrosion resistant. This enables a significant reduction of operation maintenance and coatings for the enclosure 25.

The enclosure's body may comprise a top standard flange to act as a mounting interface 25a between the turbine and a support structure 25b. The mounting interface 25a provides flexibility for a design of the support structure 25b that holds the tidal turbine for any deployments but utilizing a standard flange size which is convenient for any end user.

The generator 24 is preferably built as a permanent magnet synchronous servo geared motor with a flange mount. The flange mount may be used to attach the generator 24 to a mounting element 23, which is attached to the blade hub 22. The permanent magnet synchronous servo geared motor comprises a gearbox, which is preferably a helical gear box filled with environmental pollution oil. By means of said gearbox, the rotational speed of the blade hub 22 with the blades 21a...21n may be applied to the generator 24, such that rotational speeds of the blade hub 22 and the generator 24 appropriately fit together. The helical gear box is used to adjust a transmission ratio of the rotational speeds of the blade hub 22, a rotational speed of the generator 24 is preferably monitored by an encoded signal, being generated by an incremental encoder.

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A shaft seal of the generator 24 may be fitted with a 50mm diameter mechanical seal and covered with seal end 'O' ring protector. Mechanical seals are devices that are used to provide a seal at the point of entry or exit of a rotating shaft. The mechanical seals are used to prevent the leakage of one high pressure fluid into a lower pressure fluid. In this way, the tidal turbines can be submerged in the sea exerting the tidal turbine to a pressure around one bar, where a reliable mechanical seal performance is useful. The selected mechanical seal focuses on higher performance characteristics and is able to operate the tidal turbine under the most arduous conditions.

Optionally, temperature sensors (not shown) are built within the generator 24. Furthermore, also at least a vibration sensor and/or at least a leak detector (not shown) may be built within the generator 24. Other condition monitoring sensors include at least a humidity-, and/or radial- and/or axial vibration sensor.

The mentioned sensors allow a sensor based data collection which supports a monitoring of a condition of the tidal turbine during operation. These collected data may support a planning for future maintenance schedules and smart anomaly
5 detections.

The tidal turbine may be fitted with a waterproof bulkhead threaded connector for a connection to a control panel 30.

10 A control system of the proposed tidal turbine comprises a Variable Frequency Drive (VFD, programmable logic controller (PLC) and a supervisory control and data Acquisition (SCADA) unit. To this end, a VFD-controller may be used for the turbine control. The electrical power generated by the tidal turbine
15 is conducted to a power grid via an Active Front-End (AFE) controller, an overall electric power generation may be controlled via the programmable logic controller PLC.

Moreover, also a web base access may be foreseen with control
20 and monitoring functions. Preferably, the tidal turbine is designed with capabilities of remote monitoring and accessibility. All collected data can be stored for example in a cloud server, wherein necessary information can be processed and shared with customers and relevant authorities.

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A marine monitoring system for the proposed electricity generation system 100 may comprise at least one of the following items:

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- subsea camera
 - hydrophones
 - CTD (conductivity, temperature and density)
 - Turbulence
 - ADCP

- Active Fish finding sonar
- real time monitoring tools
- 'Best Practice' principles for monitoring during deployment

5 The data collected from the subsea camera and the hydrophone may be used to monitor the proposed electricity generation system 100 and further to monitor any fish and mammal interactions (e.g. by utilizing an AI-platform) with the electricity generation system 100.

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By means of the proposed electricity generation system 100 there may be harnessed mechanical flow energy from both upstream and downstream flows.

15 The proposed electricity generation system 100 may provide various data such as e.g. performance data, site condition data, eco system protection monitoring data, etc. wherein these data can be used for an analysis of usage and improvement of the proposed electricity generation system 100.

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REFERENCE LIST

	10	mounting device
	11	railing
5	12	opening
	13, 13'	retaining element
	14, 14'	folding device
	15, 15'	power line
	20, 20'	electricity generation device
10	20a	front section
	20b	tail section
	21a...21n	blades
	21a'...21n'	blades
	22	blade hub
15	23	mounting element
	24	generator
	25	enclosure
	25a	mounting interface
	25b	support structure
20	26	mechanical seal
	27, 27'	power line entry point
	30	control panel
	40	web
	50	power station
25	100	electricity generation system
	A, B	flow direction

Itemized list of embodiments:

The following is a list of embodiments:

- 5 1. Electricity generation system (100), comprising:
 - at least one electricity generation device (20, 20')
being removably fixed to a mounting device (10) by
means of a retaining device (14, 14', 15, 15'),
wherein the electricity generation device (20, 20')
10 is bidirectionally symmetric and comprises a water
turbine being functionally connected to a generator
(24), wherein the generator (24) comprises a helical
gearbox, wherein the generator (24) is a permanent
magnet synchronous servo geared motor, wherein the
15 generator (24) comprises an incremental encoder,
wherein a rotation of the generator (24) is mon-
itorable by a signal generated from the incremental
encoder.
- 20 2. Electricity generation system (100) according to item 1,
wherein the mounting device (10) is a bridge or a floating
body.
3. Electricity generation system (100) according to item 2,
25 wherein the floating body is one of the following: barge,
catamaran, mooring platform, existing fixed infrastruc-
tures, mobile platforms, water crafts.
4. Electricity generation system (100) according to item 2 or
30 3, wherein the electricity generation device (20, 20') is
mountable to a railing (11) of the floating body.
5. Electricity generation system (100) according to one of
items 2 to 4, wherein the electricity generation device

(20, 20') is mountable to an opening (12) located at a bottom of the floating body (10).

- 5 6. Electricity generation system (100) according to one of the preceding items, wherein electrical energy is conductable via a power line (15, 15') being guided from the generator (24) via an outside of the mounting device (10).
- 10 7. Electricity generation system (100) according to one of the preceding items, wherein a material of an enclosure (25) of the electricity generation device (20, 20') is at least one of the following: stainless steel, fiberglass, fiber reinforced plastics.
- 15 8. Electricity generation system (100) according to item 7, wherein the nose and tail cones (20a, 20b) is coated by at least two layered bio fouling coatings.
- 20 9. Electricity generation system (100) according to one of the preceding items, wherein blades (21a...21n, 21a'...21n') of the turbine are sensitive to a bi-directional water flow (A, B).
- 25 10. Electricity generation system (100) according to item 9, wherein a material of the blades (21a...21n, 21a'...21n') comprises at least one of the following: Aluminum Alloy, Carbon Fiber, Glass reinforced plastics, recycled materials.
- 30 11. Electricity generation system (100) according to one of the items 7 to 10, wherein a power line entry point (27, 27) is arranged at a top of the enclosure (25', 25').
- 35 12. Electricity generation system (100) according to one of the preceding items, wherein the electricity generation device (20, 20') comprises a control panel.

13. Electricity generation system (100) according to one of the preceding items, wherein the electricity generation system (100) is functionally connectable to the web (40).

5 14. Electricity generation device (20, 20') being adapted to be removably fixed to a mounting device (10) in the form of a floating body (10) or a fixed infrastructure, wherein the electricity generation device (20, 20') is bidirectionally symmetric and comprises a water turbine being
10 functionally connected to a generator (24), wherein the generator (24) comprises a helical gearbox, wherein the generator (24) is a permanent magnet synchronous motor, wherein the generator (24) comprises an incremental encoder, wherein a rotation of the generator (24) is mon-
15 itorable by a signal generated from the incremental encoder.

CLAIMS

1. Electricity generation system (100), comprising:
 - at least one electricity generation device (20, 20') being
5 removably fixed to a mounting device (10) formed as a floating body or as a fixed infrastructure by means of a retaining device (14, 14', 15, 15'), wherein the electricity generation device (20, 20') is bidirectionally symmetric and comprises a water turbine being functionally connected to a generator (24), wherein the generator (24)
10 comprises a helical gearbox, wherein the generator (24) is a permanent magnet synchronous motor, wherein the generator (24) comprises an incremental encoder, wherein a rotation of the generator (24) is monitorable by a signal generated from the incremental encoder, wherein electrical
15 energy is conductable via a power line (15, 15') being guided from the generator (24) via an outside of the mounting device (10), wherein the electrical energy is conductable from the mounting device (10) to a power station (50), wherein the nose and tail cones (20a, 20b,
20 20a', 20b') is coated by at least two layered bio fouling coatings, wherein blades (21a...21n, 21a'...21n') of the turbine are sensitive to a bi-directional water flow (A, B), wherein a power line entry point (27, 27') is arranged at
25 a top of an enclosure (25, 25'), wherein the electricity generation device (20, 20') comprises a control panel (30), wherein the electricity generation system (100) is functionally connectable to the web (40).
- 30 2. Electricity generation system (100) according to claim 1, wherein the mounting device (10) is a bridge.
3. Electricity generation system (100) according to claim 1, wherein the floating body is one of the following: barge,
35 catamaran, mooring platform, mobile platform, water craft.

4. Electricity generation system (100) according to claim 3, wherein the mounting device (10) is mountable to a railing (11) of the floating body.

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5. Electricity generation system (100) according to claim 3 or 4, wherein the electricity generation device (20, 20') is mountable to an opening (12, 12') in a bottom plate of the floating body (10).

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6. Electricity generation system (100) according to one of the preceding claims, wherein a material of an enclosure (25, 25') of the electricity generation device (20, 20') is at least one of the following: stainless steel, fiber-glass, fiber reinforced plastics.

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7. Electricity generation system (100) according to one of the preceding claims, wherein a material of the blades (21a...21n, 21a'...21n') comprises at least one of the following: Aluminum Alloy, Carbon Fiber, Glass reinforced plastics, recycled materials.

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8. Electricity generation device (20, 20') being adapted to be removably fixed to a mounting device (10) in the form of a floating body (10) or a fixed infrastructure, wherein the electricity generation device (20, 20') is bidirectionally symmetric and comprises a water turbine being functionally connected to a generator (24), wherein the generator (24) comprises a helical gearbox, wherein the generator (24) is a permanent magnet synchronous motor, wherein the generator (24) comprises an incremental encoder, wherein a rotation of the generator (24) is monitorable by a signal generated from the incremental encoder.

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