

Table B-1. List of marine tidal energy concepts and developers, and the status of installation and environmental studies in 2008. These devices generate electricity by converting kinetic energy of river or tidal currents. Modified from the European Marine Energy Centre website:
http://www.emec.org.uk/tidal_developers.asp

Company	Technology Name	Device Class	Prototype (Field) Installations	Country	Published Environmental Studies
Aquantis http://aquantistech.com/	Aquantis C-Plane	Horizontal axis turbine – tethered to seabed	None	USA	N
Atlantis Resources Corp http://www.atlantisresourcescorporation.com/	Aquanator	Oscillating hydrofoil - Pile mounted	None	Australia	N
BioPower Systems Pty Ltd http://www.biopowersystems.com/	bioStream and bioWave	Oscillating hydrofoil – Seabed mounted	None	Australia	N
Blue Energy http://www.bluenergy.com/	Blue Energy Ocean Turbine (Davis Hydro Turbine)	Vertical axis turbine – Ducted and pile mounted	Prototypes tested in Ontario, Nova Scotia, and Florida Gulf Stream	Canada	N
Clean Current Power Systems http://www.cleancurrent.com/	Clean Current Tidal Turbine	Horizontal axis (enclosed tips) - Pile mounted	Race Rocks Ecological Reserve, British Columbia	Canada	N
Edinburgh Designs http://www.edesign.co.uk/	Vertical-axis, variable pitch tidal turbine	Vertical axis turbine - Floating	None	UK	N
Edinburgh University	Polo	Vertical axis turbine -	None	UK	N
FreeFlow69 http://www.freeflow69.com/	OHEG and Osprey	Horizontal axis turbine – floating platform	None	UK	N
GCK Technology http://www.gcktechnology.com/GCK/	Gorlov Turbine	Vertical or horizontal axis turbine - Floating	Small prototypes tested in Maine, Massachusetts, Cape Cod Canal,	USA	N

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Company	Technology Name	Device Class	Prototype (Field) Installations	Country	Published Environmental Studies
			Brazil and Korea		
Greenheat Systems Ltd http://www.greenheating.com/	Gentec Venturi	Horizontal axis turbine (enclosed tips)	None	UK	N
Hammerfest Strom http://www.e-tidevannsenergi.com/	Tidal Stream Turbine	Horizontal axis turbine- Seabed mounted gravity base	Kvalsundet, Norway	Norway	N
Hydro-Gen http://www.hydro-gen.fr/	Hydro-gen	Horizontal axis turbine – Floating paddle wheel	None	France	N
Hydro Green Energy, LLC http://www.hgenenergy.com/index.html	Hydro kinetic turbine (HTA arrays)	Ducted horizontal axis turbine – Floating or seabed mounted	None	USA	N
Hydrohelix Energies http://www.hydrohelix.fr/	hydro-helix – Sabella	Horizontal axis turbine (enclosed tips) – Seabed mounted	None	France	N
Ing Arvid Nesheim http://www.anwsite.com/	Waterturbine	Vertical axis turbine (enclosed) - Floating	None	Norway	N
Kinetic Energy Systems http://www.kineticenergysystems.com/	Hydrokinetic Generator, KESC Bowsprit Generator, KESC Tidal Generator	Horizontal axis turbine – Seabed mounted	None	USA	N
Lunar Energy http://www.lunarenergy.co.uk/	Rotech Tidal Turbine	Horizontal axis turbine (enclosed) – seabed mounted	None, although installations in South Wales and Korea announced	UK	N

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Marine Current Turbines http://www.marineturbines.com http://www.seageneration.co.uk/	Seagen, Seaflow	Horizontal axis turbine – pile mounted	Bristol Channel, UK Strangford Lough, Northern Ireland	UK	Y
Neptune Systems http://www.neptunesystems.net/	Tide Current Converter	Superconducting magnet – seabed mounted	None	Netherlands	N
Neptune Renewable Energy Ltd http://www.neptunerenewableenergy.com	Proteus	Vertical axis turbine (enclosed) - Floating	None	UK	N
New Energy Corporation http://www.newenergycorp.ca/	EnCurrent Vertical Axis Hydro Turbine	Vertical axis (cross flow) turbine	Prototypes tested in Nova Scotia	Canada	N
Ocean Renewable Power Company http://www.oceanrenewablepower.com	OCGen	Horizontal axis (cross flow) turbine (ducted) - Floating	1/3-sized prototype tested off Eastport, Maine from 12/07 to 4/08	USA	Y
OpenHydro http://www.openhydro.com/	Open-Centre Turbine	Horizontal axis turbine (ducted) - seabed mounted or gravity base	Prototype testing in Orkney, Scotland	Ireland	N
Overberg Limited http://www.oceanflowenergy.com/	Evopod	Horizontal axis turbine - Floating	None	UK	N
Ponte di Archimede http://www.pontediarchimede.it/language_us/	Kobold Turbine	Vertical axis (crossflow) turbine – seabed mounted, floating	Strait of Messina, Sicily	Italy	N

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Company	Technology Name	Device Class	Prototype (Field) Installations	Country	Published Environmental Studies
Pulse Generation http://www.pulsegeneration.co.uk/	Pulse Generators	Oscillating hydrofoil - Seabed mounted or gravity base	None	UK	N
Robert Gordon University http://www.rgu.ac.uk/cree/general/page.cfm?page=10769	Sea Snail	Hydrofoil that induces downward force - Seabed mounted or gravity base	Orkney, Scotland	UK	N
Rugged Renewables http://www.emat.co.uk/	Savonius turbine	Horizontal axis turbine (ducted) - Seabed mounted or gravity base	None	UK	N
Scotrenewables http://www.scotrenewables.com/	SRTT (Scotrenewables Tidal Turbine)	Horizontal axis turbine - Floating	Testing planned at EMEC, Orkney, Scotland	UK	N
SMD Hydrovision http://www.smd.co.uk/	TIDEL	Horizontal axis turbine – moored to seabed	None	UK	N
Statkraft http://www.statkraft.com/	Tidevannskraft	Horizontal axis turbine - Floating	None	Norway	N
Swanturbines Ltd. http://www.swanturbines.co.uk/	Swan Turbine	Horizontal axis turbine - Seabed mounted or gravity base	None	UK	N
Tocado BV Tidal Energy http://tocado.com/?Tocado	Tocado	Horizontal axis turbine - Pile mounted	Barrage discharge in the Netherlands	Netherlands	Y
The Engineering Business http://www.engb.com/	Stingray EB Frond	Oscillating hydrofoil - Seabed mounted	Shetland Islands	UK	Y

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Company	Technology Name	Device Class	Prototype (Field) Installations	Country	Published Environmental Studies
		or gravity base			
Tidal Electric http://www.tidalelectric.com/	Tidal Lagoons (impoundments)	Horizontal Bulb turbine - Seabed mounted or gravity base	None	UK/USA	N
Tidal Generation Limited http://www.tidalgeneration.co.uk/	Deep-gen	Horizontal axis turbine - Seabed mounted or gravity base	Tests planned at EMEC, Orkney, Scotland	UK	N
Tidal Energy Ltd http://tidalenergy.net.au/?D=1	Davidson-Hill Venturi turbine	Vertical axis (crossflow) turbine (ducted) – Pile mounted	None	Australia	N
Tidal Sails http://www.tidalsails.com/	Tidal Sails AS	Oscillating hydrofoil - Floating	None	Norway	N
TidalStream http://www.teleos.co.uk/Home.htm	TidalStream	Horizontal axis turbine (ducted) – Floating, but tethered to seabed	None	UK	N
UEK Corporation http://www.uekus.com/	UEK (Underwater Electric Kite)	Horizontal axis turbine – Anchored to seabed or structures	Chesapeake Bay Ontario, other proposed sites	USA	N
University of Strathclyde	Contra-rotating (coaxial) marine current turbine	Horizontal axis turbine	None	UK	N
Verdant Power http://www.verdantpower.com/	Free Flow Turbine	Horizontal axis turbine- Pile mounted	East River, New York	USA	Y

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Company	Technology Name	Device Class	Prototype (Field) Installations	Country	Published Environmental Studies
Vortex Hydro Energy http://www.vortexhydroenergy.com/	VIVACE	Horizontal bar moves in response to vortex-induced vibrations	None	USA	N
Woodshed Technologies - CleanTechCom Ltd http://www.woodshedtechnologies.com.au/	Tidal Delay	Standard impulse turbine installed in siphon pipe over/under natural barrier	Tests planned at EMEC, Orkney, Scotland	Australia / UK	N

Table B-2. List of marine wave energy concepts and developers, and the status of installation and environmental studies in 2008. These devices generate electricity by converting the potential energy of waves. Modified from the European Marine Energy Centre website:
http://www.emec.org.uk/wave_energy_devices.asp

Company	Technology Name	Device class	Prototype (Field) Installations	Country	Published Environmental Studies
Able Technologies L.L.C. http://www.abletechnologiesllc.com/	Electricity Generating Wave Pipe	Point absorber – Fixed pipe is secured to the ocean floor	None	USA	N
Applied Technologies Company Ltd http://www.atecom.ru/we/	Float Wave Electric Power Station	Attenuator	None	Russia	N
Aqua Energy / Finevara Renewables http://finavera.com/	Aqua Buoy	Point absorber – Moored to the seabed	Makah Bay, Washington Figueira da Foz, Portugal	USA	N
Aquamarine Power http://www.aquamarinepower.com/	Oyster	Oscillating wave surge converter – Secured to bottom in shallow water	EMEC tests at Orkney (?)	Scotland	N
Arlas Invest	MAUI Wave Energy Converter	Point absorber	None	Spain	N
AW Energy http://www.aw-energy.com/	WaveRoller	Oscillating wave surge converter – Secured to bottom in shallow water	EMEC/Orkney Portugal	Finland	Y
AWS Ocean Energy http://www.awsocan.com/	Archimedes Wave Swing	Point absorber – Moored to the seabed	EMEC/Orkney	Scotland	N
BioPower Systems Pty Ltd http://www.biopowersystems.com/	bioWave	Oscillating wave surge converter – Secured to bottom in shallow water	Australia (early 2009)	Australia	N
Brandl Motor http://brandlmotor.de/index_eng.htm	Brandl Generator	Attenuator – Moored to seabed	None	Germany	N
Caley Ocean Systems http://www.caley.co.uk/os/index.htm	Wave Plane	Overtopping device	No longer involved?	UK/Denmark	N
College of the North Atlantic	Wave Powered Pump – small	Attenuator	None	Canada	N

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Company	Technology Name	Device class	Prototype (Field) Installations	Country	Published Environmental Studies
http://www.cna.nl.ca/oar/research.asp	and designed for aquaculture but could be scaled up				
Columbia Power Technologies/Oregon State U. http://www.columbiapwr.com/	Direct drive, permanent magnet linear generator buoy	Point absorber – moored to the seabed	Newport, Oregon	USA	N
C-Wave http://www.cwavepower.com/	C-wave	Attenuator / Oscillating wave surge converter	None	UK	N
Daedalus Informatics Ltd http://www.daedalus.gr/	Wave Energy Conversion Activator	Oscillating water column - Shoreline	None	Greece	N
Delbuoy	Wave Powered Desalination	Point absorber	No longer under development	USA	N
Ecofys http://www.ecofys.com/	Wave Rotor	Submerged pressure differential – Secured to the seabed	None	Netherlands	N
Ecole Centrale de Nantes http://www.ec-nantes.fr/	SEAREV	Attenuator – Moored to seabed	None	France	N
Edinburgh University http://www.mech.ed.ac.uk/research/wavepower/	Sloped IBS Buoy	Attenuator	None	UK	N
Embley Energy http://www.sperboy.com/	Sperboy	Attenuator / Oscillating water column – Moored to the seabed	None	UK	N
Energias de Portugal	Foz do Douro breakwater	Oscillating water column – Breakwater at a river mouth	Foz do Douro, Portugal	Portugal	N
Float Inc. http://www.floatinc.com/	Pneumatically Stabilized Platform	Attenuator	None	USA	N
Floating Power Plant AS http://www.poseidonorgan.com/	Poseidon's organ	Oscillating wave surge converter - floating	Reduced-scale prototype at Lolland,	Denmark	N

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Company	Technology Name	Device class	Prototype (Field) Installations	Country	Published Environmental Studies
			Denmark		
Floating Wave Powered Generator http://www.gedwardcook.com/wave.html	Patent Pending Number US60/662/582	Attenuator	None – patent is for sale	USA	N
Fred Olsen & Co./Ghent University http://www.seewec.org/	SEEWEC	Attenuator	None – Planned for Wave Hub, Cornwall	Norway / EU	N
Green Ocean Energy http://www.greenoceanenergy.com/	Ocean Treader	Point absorber – Moored to the seabed	None	UK	N
Greenheat Systems Limited http://www.greenheating.com/	GENTECH venturi	Overtopping device	None	UK	N
Hydam Technology	McCabe Wave Pump	Attenuator – Floating barges	None	Ireland	N
Independent Natural Resources http://www.inri.us/	SEADOG	Attenuator	Pilot-scale tests near Freeport and Galveston, Texas	USA	N
Ing Arvid Nesheim http://www.anwsite.com/	Oscillating Device	Point absorber – Moored to the seabed	None	Norway	N
Instituto Superior Tecnico http://www.pico-owc.net/	Pico OWC	Oscillating water column – shoreline installation	Pico Island, Azores, Portugal	Portugal	N
JAMSTEC http://www.jamstec.go.jp/jamstec/MTD/Whale/	Mighty Whale	Oscillating water column – Floating, and moored to the bottom	Gokasho Bay, Japan	Japan	N
Joules Energy Efficiency Services Ltd	TETRON	Other	None	Ireland	N
Lancaster University http://www.engineering.lancs.ac.uk/lureg/research/	PS Frog	Attenuator	None	England	N
Langlee Wave Power AS http://www.langlee.no/	Langlee Water Wings	Oscillating Wave Surge Converter – Secured to	None	Norway	N

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Company	Technology Name	Device class	Prototype (Field) Installations	Country	Published Environmental Studies
		the bottom			
Manchester Bobber http://www.manchesterbobber.com/	Manchester Bobber	Attenuator	None	UK	N
Martifer Energia http://www.martifer.com/Group/EN/home.html	ONDA 1	Attenuator – Floating and moored to the seabed	None	Portugal	N
Maritime Energy Developments http://pagesperso-orange.fr/bulgewave/	Anaconda Wave Energy Bulging Snake	Attenuator – Moored to the bottom	None	UK	N
Muroran Institute of Technology http://www.muroran-it.ac.jp/index-e.html	Pendulor	Oscillating wave surge converter	Matshike Harbor, Muroran, Japan	Japan	N
Neptune Renewable Energy Ltd http://www.neptunerenewableenergy.com/	Triton	Oscillating wave surge converter	None	UK	N
Neptune Systems http://www.neptunesystems.net/	MHD Neptune/Superconducting magnet solenoid	Point absorber – secured to the seabed	None	Netherlands	N
Norwegian University of Science and Technology http://www.sffe.no/index_e.htm	CONWEC	Point absorber	None	Norway	N
Ocean Energy Ltd http://www.oceanenergy.ie/	OE Buoy	Oscillating water column – Floating and moored to the bottom	Galway, Ireland	Ireland	N
Ocean Motion International http://www.oceanmotion.ws/	OMI Combined Energy System	Point absorber – Secured to the seabed with rigid piling	None	USA	N
Ocean Navitas http://www.oceannavitas.com/	Aegir Dynamo	Attenuator	None	UK	N
Ocean Power Technologies http://www.oceanpowertechnologies.com/	PowerBuoy	Point absorber – moored to the seabed	New Jersey Oahu, Hawaii Santona, Spain Planned for Wave	UK / USA	Y

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Company	Technology Name	Device class	Prototype (Field) Installations	Country	Published Environmental Studies
			Hub, Cornwall		
Ocean Wave Energy Company http://www.owec.com/	OWEC	Point absorber	None	USA	N
Ocean Wavemaster Ltd http://www.oceanwavemaster.com/	Wave Master	Point absorber – Moored to the seabed	None	UK	N
Oceanlinx (formerly Energetech) http://www.oceanlinx.com/	Denniss-Auld Turbine	Oscillating water column – Floating and moored to the seabed	Port Kembla, Australia Planned for Wave Hub, Cornwall	Australia	N
Offshore Wave Energy Ltd http://www.owel.co.uk/print/overview.htm	OWEL Energy Converter / Grampus	Oscillating water column	None	UK	N
ORECon http://www.orecon.com/	MRC 1000	Oscillating water column – Floating and moored to the bottom	None	UK	N
Pelagic Power http://www.pelagicpower.com/	Pelagic Power wave pump	Point absorber – Moored to the seabed	None	Norway	N
Pelamis Wave Power http://www.pelamiswave.com/	Pelamis	Attenuator	Agucadoura, Portugal Orkney, Scotland	UK	N
Renewable Energy Holdings http://www.reh-plc.com/	CETO	Oscillating wave surge converter	Fremantle, Western Australia	AUS / UK	N
Scientific Applications & Research Associates, Inc. (SARA) http://www.sara.com/RAE/ocean_wave.html	MHD Wave Energy Converter (MWEC)	Point absorber – moored to the seabed	None	USA	N
SDE http://www.sde.co.il/	S.D.E	Attenuator - Shoreline	Israel	Israel	N

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Company	Technology Name	Device class	Prototype (Field) Installations	Country	Published Environmental Studies
Sea Power International AB http://www.seapower.se/english.htm	Stream turbine	Attenuator (might be Savonius vertical axis turbine?)	?	Sweden	?
Seabased AB http://www.seabased.com/engelsk/	Direct drive, permanent magnet linear generator buoy	Point absorber – fixed to the seabed	None	Sweden	N
SeaVolt Technologies http://www.seavolt.com/	Wave Rider	Attenuator – moored to seabed	None	USA	N
SEEWEC Consortium http://www.seewec.org/index.html	FO3 device (Buldra)	Point absorber – floating and moored to the seabed	Norway	UK	N
SeWave Ltd http://www.sewave.fo/	OWC	Oscillating water column	None	Faroe Islands	N
SurfPower http://www.surfpower.ca/	SurfPower	Point absorber – fixed to the seabed	None	USA	N
Swedish Centre for Renewable Electric Energy Conversion http://www.el.angstrom.uu.se/meny/eng/index_E.html	Wave Power Project, Islandsberg	Point absorber – generator mounted on the seabed	Lysekil, Sweden	Sweden	Y
SyncWave Energy Inc. http://www.syncwaveenergy.com	SyncWave Power Resonator	Point absorber	None	Canada	N
Trident Energy Ltd, Direct Thrust Designs Ltd http://www.tridentenergy.co.uk/index.php	Direct Energy Conversion Method	Point absorber	Suffolk Coast, England in summer 2008	UK	N
Trotman Unit (Private Researcher) http://www.trotmanunitwavepower.com/	Inshore Wave Power	Attenuator / Point absorber	None	Scotland	N
Union Electrica Fenosa of Spain http://www.unionfenosa.es/	OWC	Oscillating water column	None	Spain	N
Vortex Oscillation Technology Ltd	Vortex oscillation	Attenuator	None	Russia	N

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Company	Technology Name	Device class	Prototype (Field) Installations	Country	Published Environmental Studies
http://www.vortexosc.com/					
Wave Dragon http://www.wavedragon.net/	Wave Dragon	Overtopping device – Floating, moored to the seabed	Denmark/Wales	Wales / Denmark	Y
Wave Energy http://www.waveenergy.no/index.htm	Seawave Slot-Cone Generator	Overtopping device – Shoreline, floating or fixed to the seabed	None	Norway	N
Wave Energy Technologies, Inc. http://waveenergytechnologies.com/	WET EnGen	Point absorber – moored to the bottom	Small-scale model off Sandy Cove, Nova Scotia	Canada	N
Wave Energy Technology http://www.wavenergy.co.nz/	(WET-NZ)	Attenuator	Small experimental device on Canterbury coast	New Zealand	N
Wave Power Group http://www.mech.ed.ac.uk/research/wavepower/	Salter Duck, Sloped IPS	Attenuator	None	UK	N
Wave Star Energy ApS http://www.wavestarenergy.com/	Wave Star	Point absorber	Small scale model since 2006 at Nissum Bredning, Denmark	Denmark	N
Waveberg Development http://www.waveberg.com/	Waveberg	Attenuator – moored to the seabed	Small scale models in Nova Scotia and Florida	Canada	N
WaveBob Limited http://www.wavebob.com/	Wave Bob	Point absorber – moored to the seabed	Galway, Ireland	Ireland	N
Wavegen http://www.wavegen.com/	Limpet	Oscillating water column	Island of Islay, Scotland Mutriku, Spain	UK	N
Wavemill Energy	Wavemill	Oscillating water column	None	Canada	N

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Company	Technology Name	Device class	Prototype (Field) Installations	Country	Published Environmental Studies
WavePlane A/S http://www.waveplane.com/	Wave Plane	Overtopping device	None	Denmark	N
West Wave (consortium of E.ON and Ocean Prospect) http://www.eon-uk.com/generation/westwave.aspx	Pelamis	Attenuator	Planned for Wave Hub, Cornwall	UK	N
WindWavesAndSun http://www.windwavesandsun.com/	WaveBlanket	Attenuator	None	USA	N