An overview of equipment

The World's first wave power plant was Akuacadura (Portugal). It used three Pelamis wave energy converters with a total installed power of 2.25 MW. The power plant started producing electricity in July 2008 [1]. The Wave Power Islay LIMPET was installed and connected to the National Network in 2000. and is the World's first commercial wave-powered installation. Scotland funded a 3 MW wave power plant in Scotland on 20-th February 2007. [2].

"Bombora wave power" [3] is located in Perth (Western Australia) and is currently developing a “mWave” [4] flexible membrane converter. The CETO wave power plant at the western coast of Australia operates to demonstrate commercial viability and has been further developed following an environmental impact assessment [5, 6]. Two fully submerged buoys attached to the seabed transform ocean energy into hydraulic pressure on land. It drives the electric generator as well as produces fresh water [7, 8]. Ocean Power Technologies (OPT Australasia Pty Ltd.) is a 19 MW wave power plant connected to the network near Victoria (Portland) [9]. By the end of 2013., Oceanlinx planned to establish a commercial scale demonstration device for Port MacDonnell (off the coast of South Australia). This device, called GreenWAVE, has an electrical capacity of 1MW [10]. Reedsport, Oregon – Commercial Wave Power on the US West Coast, near Reedsport (Oregon). The first phase of this project was designed for ten PB150 PowerBuoys or 1.5 MW [11, 12]. The Azura Wave Power Unit is a 45-ton wave power converter located 30 meters deep in Kaneohe Bay [13]. Eugen Rusu provides information on wave states and the efficiency of wave transformation in three different types of coastal environment: Continental Ocean, island environment and marine environment. The review evaluates several types of converters that cover a wide range of existing offshore installations [14]. The author believes that the future belongs to converters with variable capacity. Authors V. Jayashankar, K. Mala, S. Kedarnath, J. Jayaraj, U. Omezhilan, and V. Krishna [15] highly appreciate the prospects of oscillating columns for commercial production electricity. Equipment with an average energy of 24 kW / m and the ability to produce 100 GWh in two years is described. Simulations show that turbine efficiency can exceed 60% (10 -100%) of rated power. It has been shown that a wavelength of about 660 m with 11 turbine generators is sufficient to meet design requirements and an average wave efficiency of about 36%. Of course, 60% has a high efficiency factor, but the machine is massive and therefore thought to be expensive (Fig. 1).

Fig. 1. Indian wave power converter (*OWC*) [15]

Obviously, efficiency is calculated not from the power of the wave, but from the average air flow capacity.

Equipment Classification

There are around 240 different projects in the world. The equipment differs according to the operating principles by which it can be classified. The *ITTC* article [16] provides a evaluation of wave transformers depending on whether the structure is fixed or floating.

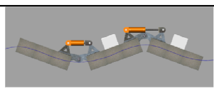
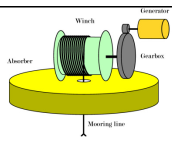
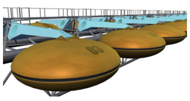
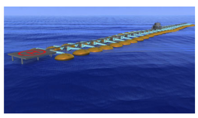
In the *IRENA* article [17], the basic principle of the classification of equipment is also whether the structure is fixed or floating and then further expanded according to the location of the site.

We offer to classify equipment according to the principle of operation and compare how they respond to our criteria and options of location in particular zone (shallow-water, medium-depth and deep-water zones) (Table 3.1).

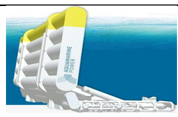
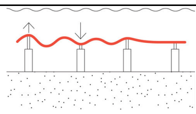
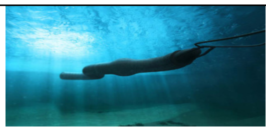
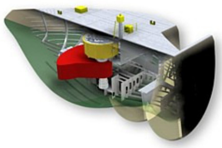
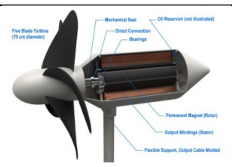
We offer to evaluate wave transformation equipment by operating principle and placement area – shallow (*Sh*), medium (*M*) and deep (*D*) water areas. (Table 1).

Table 1.

Classification of wave conversion equipment

	Type	**Illustration**	***Sh***	***M***	***D***
1	Surface damper [18]			x	x
2	Float type absorber [19, 20, 21]	  	x	x	x

continuation of the table 1

3	Fluctuating wave stream converter [22]		x		
4	Air pressure camera [23]		x	x	x
6	Overflow converter [28]		x	x	x
7	Underwater pressure difference receiver [24, 25]		x	x	
8	Air bubble engine [26]			x	x
9	Rotating mass [27]			x	x
10	Flow turbine with horizontal axis [28]		x	x	
11	Flow turbine with vertical axis [29]		x	x	x

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