Wave

Most of the wave power approaching Ireland comes from the Atlantic. The average wave power in Ireland is the strongest in Europe reaching 76 kW per metre of exposed coastline off the west coast (see figure 19 below). As with offshore wind, wave energy in Ireland beyond 2020 is centred around the potential to export and therefore only a share of the total potential capacity for domestic use is assessed. Refer to SEAI's Ocean Energy Roadmap for estimated total potential capacity for export in 2050.

One of the leading offshore wave devices is the Pelamis, a 'sea snake' which floats in deep water and faces nose-on to oncoming waves. The waves make the snake flex, and these motions are resisted by hydraulic generators. The peak power from one snake is 750 kW; in the best Atlantic location one snake would deliver 300 kW on average. Other designs such as the Wells and Impulse turbines are in development led by the Wave Energy Research Team (WERT) in the University of Limerick. A national full scale test site for wave energy in Ireland is located in Belmullet, Co. Mayo.

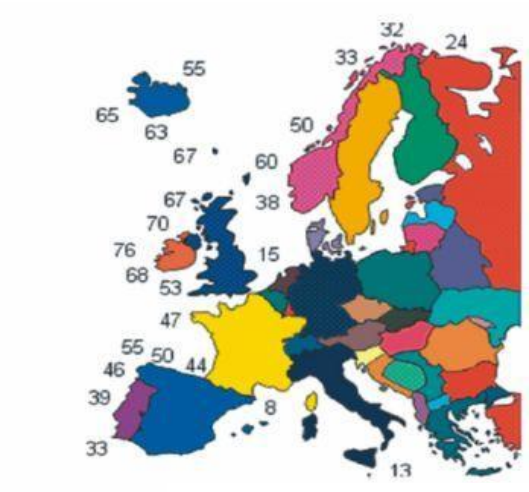

Figure 19: European Wave Energy Atlas, Average Theoretical Wave Power.

Trajectory 1

Trajectory 1 assumes there is little investment in wave power, with no wave machines deployed up to 2050.

Trajectory 2

Trajectory 2 assumes that Ireland deploys the equivalent of 3 km of Pelamis wave farms in the Atlantic by 2050. This requires a Pelamis every 30 metres over the 3 km stretch, totalling around 90 machines. The machines deliver 15 kW per metre of the wave farm (25% of the waves' raw power) with an availability of 90% (allowing time for maintenance). The total output of these wave farms is 0.4 TWh/y.

Trajectory 3

Trajectory 3 assumes that Ireland deploys the equivalent of 670 Pelamis machines over 17.5 km of the Atlantic coastline by 2050, delivering the same power per machine as in Trajectory 2. The total output of these wave farms is 2.6 TWh/y.

Trajectory 4

Trajectory 4 assumes that Ireland deploys the equivalent of around 1,600 Pelamis machines over a 42 km stretch. With a capacity of 2.4 GW, the total output of such wave farms is 6.2 TWh/y.

Figure 20: Electricity generated by wave energy under 4 trajectories in TWh/yr.