

# Marine renewable energies

## Huge potentials as yet largely untapped



### Reference points

#### Offshore wind turbine

Estimated potential in 2020:  
France: 6 000 MW, i.e. 1 200 offshore wind turbines  
United Kingdom: 32 000 MW, i.e. 6 400 offshore wind turbines

#### Wave power generation

France and the United Kingdom account for 80% of the resource potential in Europe.  
Estimated potential: 5 to 8 GW in total in the two countries combined.

#### A few definitions

**Offshore wind energy:** uses sea wind. A distinction is made between bottom-mounted offshore wind turbines (on a base) and floating offshore wind turbines (experimental stage).

**Hydrokinetic energy:** uses kinetic energy generated by marine and river currents.

**Tidal power:** uses water movement during tides in areas of with large tidal range.

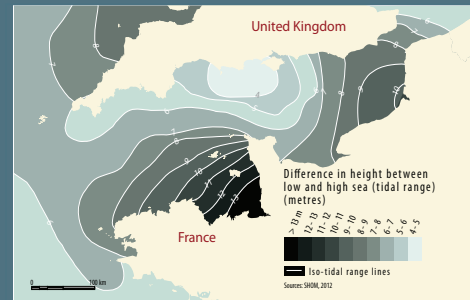
**Ocean Thermal Energy (OTE):** uses the temperature difference between surface water and deep water (warm seas).

**Wave power:** uses the power of ocean swell and waves (experimental stage).

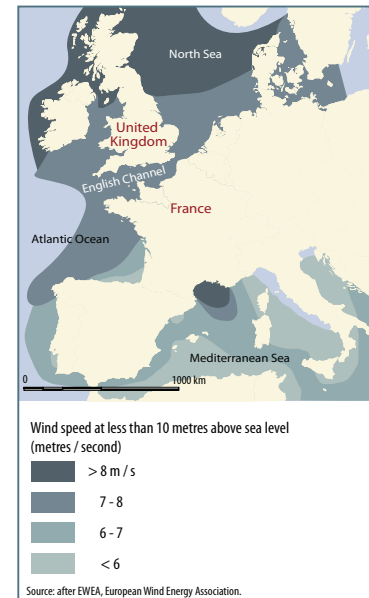
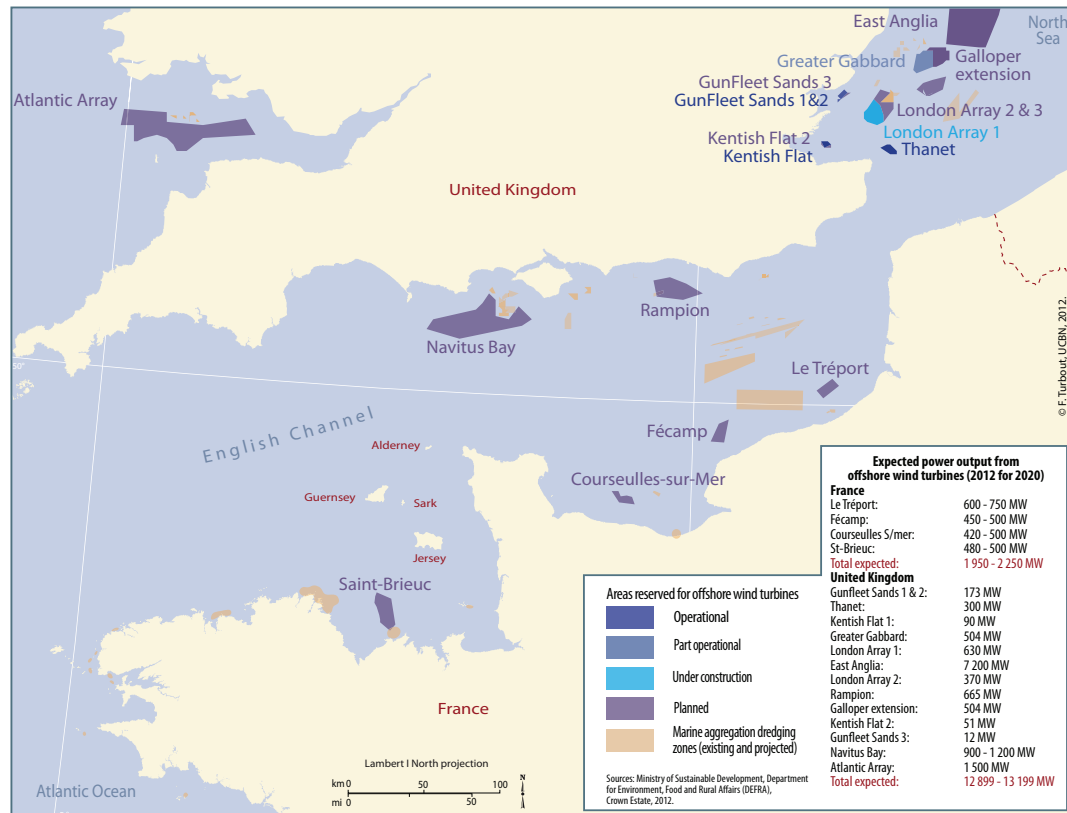
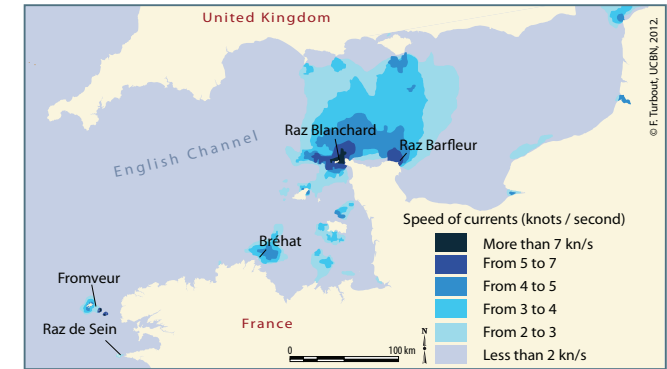
**Osmotic energy:** uses the excess pressure generated by the displacement of a mass of fresh water into a mass of salt water (experimental stage).

**Algae fuels:** use marine microalgae to produce fuel (experimental stage).

### Wave-energy converter potential in the English Channel



### Wave-power potential in the English Channel



Covering some 75,000 square kilometres, the Channel harbours considerable energy potential. Strong, constant winds, currents that can exceed 7 knots a second, a powerful sea swell and strong tidal ranges, all provide possible sources for energy generation. This cumulative potential of the Channel is rarely found on this scale anywhere else in the world.

Given the energy challenge facing modern societies, marine renewable energies (MREs) represent a key investment area for the future.

Some techniques are still at the prototype stage and require on-site trials before widespread development is possible. This is the case of energy generated by marine currents that activate underwater turbines. The Channel has the highest potential for such energy in Europe, with an estimated 80% of the resource to be found around the coasts of France and Britain. Some zones are of particular interest: Raz Blanchard, Raz de Sein, Raz de Barfleur, Fromveur or the currents off the island of Bréhat.

Offshore wind farms, another source of energy, have already been installed by many states, particularly in the North Sea. Denmark was a forerunner in this field, with the large offshore farms Horns Rev 1 and 2. United Kingdom is also a leading country in this respect, currently operating the second largest offshore wind farm at Thanet, off the Kent coast. It has been up and running since September 2010 and alone generates 300 MW worth of energy. It should be capable of supplying a population of some 240,000 inhabitants.

The English coastal waters along the Channel currently accommodate, or will accommodate in the years ahead, 13 offshore wind farms, four of which are already operating, one under construction and seven at the drawing board stage. Ultimately, expected generation should reach around 11,699 MW.

The situation is different on the French side of the Channel. After the initial call for proposals, the designation of four offshore wind farm installation zones should make it possible to generate around 2,250 MW. By 2020, France hopes to produce around 6,000 MW and the UK 32,000 MW. However, the installation of such infrastructures is not without local resistance, particularly in terms of social acceptability, and the projects are sometimes held up by seafarers and coastal residents alike.

The Channel's potential is such that it seems impossible to ignore in the near and longer term this energy windfall. The cohabitation of these new developments harmoniously alongside other longer-standing activities within a maritime space already under great pressure in terms of use, will remain a major challenge for decades to come.