Abstract—Tidal stream turbines are often described as underwater windmills. They are driven by the kinetic energy of moving water in a similar way that wind turbines use moving air. The generator is placed into a marine current that typically results when water being flowing underwater currents around the world to make this form of marine renewable energy worth pursuing. Two masses of land. There are sufficient numbers of such fast-flowing underwater currents around the world to make this form of marine renewable energy worth pursuing. Currents could also help fulfill the Climate Change Committee’s recent request in 2010 that calls for an almost complete. In figure 1, the areas between the coasts of Ireland and Scotland that are colored magenta would merit the application of tidal current capturing systems. Harnessing the marine moved by tidal forces comes up against, or moves around, an obstacle or through a constriction such as a passage between two masses of land.

Keywords—Tidal stream turbines; generator; marine renewable energy; tidal

1. INTRODUCTION

Decarbonization of the UK’s electricity supply by 2030. In their report, Future Marine Energy, published in 2006, the Carbon Trust estimated that tidal stream energy could meet 5% of the UK’s electrical energy needs, reducing the country’s dependence upon carbon intensive imported fossil fuels. Other studies have predicted that tidal generators could produce up to 10% of the UK’s electrical energy needs. A point not lost on the UK government and the devolved administrations who see the industrial growth opportunities that tidal and wave energy could offer. Tidal flows have the advantage of being as predictable as the tides that cause them; both in terms of timing and in judging their maximum velocity. This long-term predictability helps greatly in electricity generation, enabling more efficient grid management and thus reducing the total amount of power that needs to be generated.

Energy derived from the moon now trickles into an Artic tip of Norway via a novel underwater windmill like device powered by the rhythmic slosh of the tides. The tidal turbine is bolted to the floor of the Kvalsund channel and is connected to the nearby town of Hammerfest’s power grid on September 20th. This is the first time in the world that electricity directly from a tidal current has been feed into a power grid. The gravitational tug of the moon produces a swift tidal current there that cause though the channel at about 8 feet (2.5 meters) per second and spins the 33-foot (10 meters) long blades of the turbine. The blades automatically turn and rotate at a pace of seven revolutions per minute, which is sufficient to produce 700,000 kilowatt hours of non-polluting energy per year- enough to power about 35 Norwegian homes (70 U.S homes).

It can also be defined as, Energy derived from the moon that now helps to power a small arctic village. An Underwater windmill-like device gets power from the tides. The gravitational pull of the moon produces a swift tidal current, which courses through the channel and spins the long blades of the turbine.

2. SOLAR RADIATION

Two British consultants have developed an underwater pump that can irrigate riverside fields without using fuel or causing pollution. The prize-winning turbine is easy to construct and can work continuously. Originally designed to harness the energy of the Nile to irrigate the desert areas of Sudan, the pump has a three-blade rotor that utilizes the energy of moving water, just as a windmill uses wind.

The underwater pump can be operated by a single person with little training. Beneath, 20 meters down, the single 11-
A meter long rotor turns up to 17 and a half times a minute at a maximum speed of 12 meters per second, drawing energy from the water’s current. The €6 million ($7 million) project’s supporters — which include the British and German governments and the European Union — hope that tidal turbines may one day be a further source of energy. Unlike sun and wind energy, tidal energy is reliable, since it’s not affected by the weather “As long as the earth turns and the moon circles it, this energy is a sure thing,” Jochen Bard from ISET, a German solar energy institute involved in the project, told the dpa news agency. Researchers launched the first offshore tidal energy turbine on Monday. The rotor on the English coast uses the power of the tides to generate electricity. Just the beginning: The first “farm” of tidal turbines could spring up off the English coast within years.

Imagine taking a windmill, turning it on its side and sinking it in the ocean. That, in effect, is what engineers have done in the Bristol Channel in England. The aim is to harness the energy the tide produces day in, day out. On Monday, the world’s first prototype tidal energy turbine was launched. The “Sea flow” installation was built into the seabed about one and a half kilometers (one mile) off the Devon coast. Above the surface, only a white and red-striped tower is visible. The red dots show locations where tidal energy turbines could be employed in Britain and northern France. Sea flow can generate around 300 kilowatts, while rotors developed in the future should be able to produce a megawatt. The new facility is pegged to be linked to Britain’s national grid in August, and a second rotor is to be added by the end of 2004. Marine Current Turbines (MCT), which operates Sea flow, estimates that 20 to 30 percent of British electricity needs could be provided by the new technology.

3. PRINCIPLES:

Underwater turbines operate on the same principles that wind turbines use; a flow of fluid moves a set of blades creating mechanical energy which is then converted to electrical energy. They are equally troublesome for environmentalists, as wind turbines interrupt bird flights just as water turbines can disturb underwater life. One advantage water turbines enjoy over other sources of renewable energy is a predictable tide table.

MCT’s ocean energy device works on the same principles as a windmill, where large underwater rotors, shaped like propellers, are driven by the huge mass of flowing water to be found at certain places in the sea. The technology consists of rotors mounted on steel piles (tubular steel columns) set into a socket drilled in the seabed. The rotors are driven by the flow of water in much the same way that windmill rotors are driven by the wind, the main difference being that water is more than 800 times as dense as air, so quite slow velocities in water will generate significant amounts of power. The energy generated, being derived from tides has the added significant advantage of being predictable.

4. WORKING:

Underwater turbines rely on tides to push water against angled blades, causing them to spin. These turbines can be placed in natural bodies of water, such as harbors and lagoons that naturally feature fast-moving flows of water. These turbines must be able to swivel 180 degrees to accommodate the ebb and flow of tides, as demonstrated by the Sea Gen prototype turbine in Ireland. As the blades spin, a gearbox turns an induction generator, which produces an electric current. Other devices can be tethered and attached to a float, such as the Evopod in England. This design allows the face of the turbine to always face the direction of the current, much like a moored boat does.
blades to turn a generator, similar to how a wind turbine works. Because water is far more dense than air, spinning blades can potentially be more productive than off-shore wind turbines for the same amount of space. In addition to being renewable, another key advantage of ocean power is that it’s reliable and predictable, said Daniel Englander, an analyst at Green-tech Media. Although they can’t generate power on-demand like a coal-fired plant, the tides and wave movements are well understood, giving planners a good idea of energy production over the course of a year.

There are only a few underwater turbines in operation today and they all operate like underwater windmills, with their blades turning at right angles to the flow of the water. In contrast, the Oxford team’s device is built around a cylindrical rotor, which rolls around its long axis as the tide ebbs and flows. As a result, it can use more of the incoming water than a standard underwater windmill.

5. ADVANTAGES:

- The advantages of the underwater windmill is much more than the disadvantages
- clean and renewable source of energy.
- have lesser impact on the environment.
- Their cost is very low.
- the maintenance is little, but it gives long life time.
- reduces the depends upon fossil fuels.

6. DISADVANTAGES:

- The initial cost is too high
- Very difficult to install.
- The blade must be coated to avoid corrosion.
- Special type material must have to be used for blade.

7. CONCLUSION:

Tides play a very important role in the formation of global climate as well as the ecosystem for ocean inhabitants. At the same time tides are substantial sources of clean renewable energy for the future human generation. Depilating oil reserves, the emission of greenhouse gases by burning coal, oil and other fossil fuels as well as the accumulation of nuclear waste from nuclear reaction will inevitably force people to replace energy in the future. Tidal energy is one of the best candidates for this approaching revolution. Development of new, efficient, low cost and environmentally friendly hydraulic energy converts suited to free-flow waters.

REFERENCES


