# ENERGY BUZZ

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INSIDE THIS ISSUE



Ministry of Communication,
Works, Labour & Energy
Brades, Montserrat, MSR1110

# FROM THE MINISTER'S CHAIR

This November CARICOM will be celebrating energy month under the local theme "Energy Revolution Powering Montserrat's Evolution."

The world is going through turbulent times, a global health pandemic, shipping logistical issues, climate change and an energy crisis. These are just part of a long depressing list and although they will pass, how quickly will depend on the commitment of us on this earth. We here in Montserrat will also have to decide on the future we want to create. How do we evolve from dependency to resilience and sustainability? There has to be an evolution in our thinking and actions to power our revolution.

For nearly three decades the UN has been bringing together almost every country on earth for global climate summits – called COPs – which stands for 'Conference of the Parties'. In that time climate change has gone from being a fringe issue to a global priority. This year will be the 26th annual summit – giving it the name COP26 - and many believe to be the world's best last chance to get runaway climate change under control.

Montserrat, we cannot go back to business as usual. We cannot simply return to our original state. The challenge is to become sustainable in the face of current and future crises. We are at pivotal moment in the fight against climate change as we see the effects it has on our small island developing states: more frequent and stronger hurricanes, sea level rise, coastal degradation, more intense rainstorms, death of coral reefs and the collapsing of fishing stock. All of these affect livelihoods.

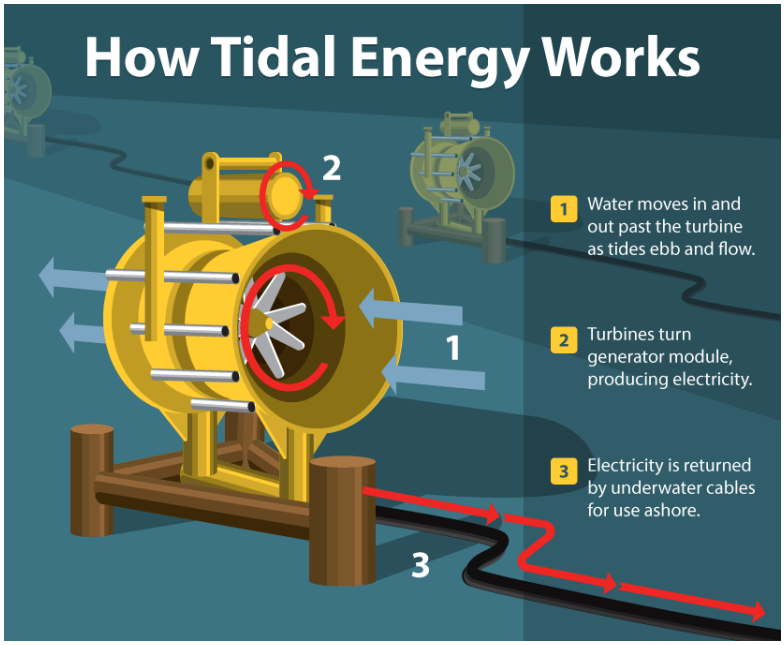
People of Montserrat I submit that we have to show leadership. We have to make Montserrat an example to the world on what a sustainable island looks like. One that lives in harmony with nature and still provides the energy needs of its citizens. One that has prosperity without resorting to ecological barbarity.  We have indigenous resources that can be used to power our economy, and now have 1 MW of installed solar capacity.

The MCWLE will soon launch its e-mobility strategy. Too much of our money leaves the island to pay for fossil fuels and enrich countries outside our borders. Let us generate our own energy locally and use it to power our transportation sector. Collectively, these actions will help create jobs, reduce emissions and reduce long-term dependence on imported fossil fuels, helping Montserrat to create a new foundation for a diverse, resilient and sustainable economy. Montserrat will demonstrate a new vision for the region's climate future and become an example for the world – transforming its citizens into controllers of their destiny and leaders of the clean energy era. An Energy Revolution Powering Montserrat's Evolution. We can and we shall do it.

# TIDAL ENERGY

## What is Tidal Energy?

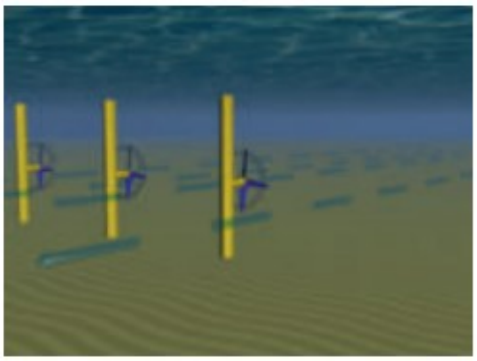
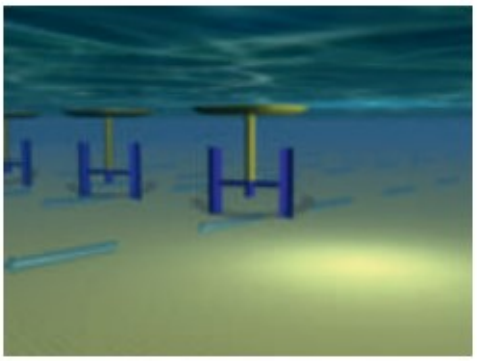
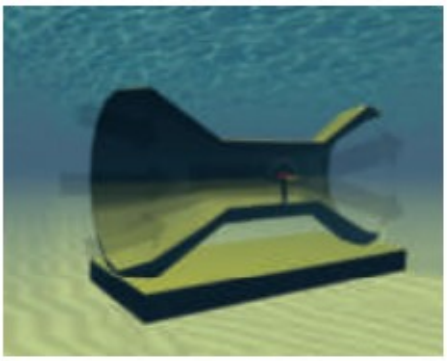
Tidal energy is a renewable energy that harnesses the natural rise and fall of ocean tides and currents. Tides are the rise and fall of water levels due to the gravitational forces of the sun and moon. As the moon is closer, it has more prominent effects on the tides. Shores experience either a diurnal or semi-diurnal tide that consists of one or two high and low tides respectively.



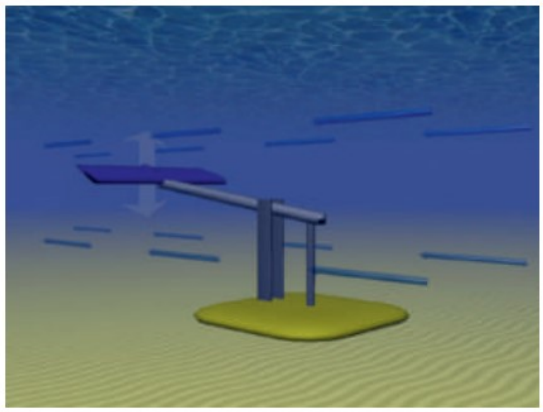

## Tidal Energy: Technologies and Harnessing

Technologies used to harness tidal energy include horizontal-axis axial and vertical-axis cross flow turbines, and reciprocating devices. These technologies convert the kinetic energy due to the movement of the water, into power.

- Horizontal and vertical axis turbines use blades that are either parallel (horizontal) or perpendicular (vertical) to the flow direction. Horizontal and vertical turbines may also be enclosed, and are referred to as Enclosed, Ducted or Shrouded turbines. These turbines are positioned either parallel or perpendicular to the direction of flow. The blades tend to be small due to the high density of water, and are attached to a central rotor shaft. As the blades turn, power is transmitted to the generator shaft.

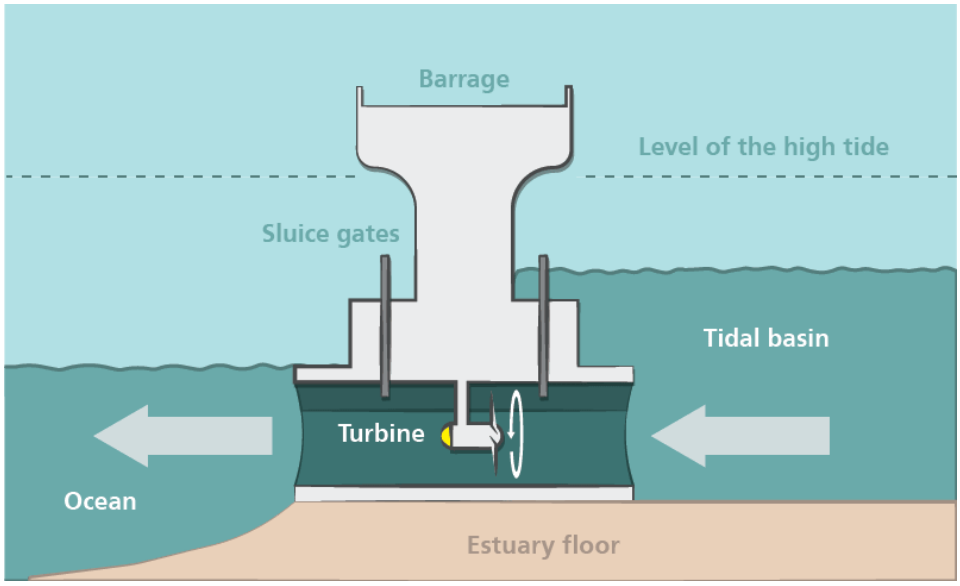




- Reciprocating Devices possess blades called hydrofoils, which are shaped like airplane wings and move up and down as the tide flows on either side. The up and down motion is converted into rotation to drive a rotating shaft or connected to pistons in a hydraulic system for power production.



Tidal energy can also be generated from the use of tidal barrages and tidal lagoons.

- A tidal barrage is a large dam that allows water to spill over the top or through turbines. These can be constructed across rives, bays and estuaries. As the tide rises, water flows through the sluice gates into a basin. The basin is emptied on the outgoing low tide. A two-way tidal power system can produce electricity from both the high and low tides.




- A tidal lagoon is a body of water that is partially enclosed by natural or manmade barriers, and may have estuaries emptying into them. Energy generation functions similarly to that of the tidal barrage. The turbines work as the lagoon fills and empties, producing a constant supply of electricity.

tidal energy | National Geographic Society
Difference between tidal and wave energy | Difference Between
Tidal Energy Technology Brief (irena.org)

# UPDATES FROM COP 26

Key decisions, commitments and potential impacts from COP26:

* Twenty countries, including the UK, have agreed to end financing for fossil fuel projects abroad
* The G7, world's richest nations, have agreed to end their financial support for coal development overseas, in a major step towards phasing out the dirtiest fossil fuel.
* More than 40 countries have committed to shift away from coal, in pledges made at the COP26 climate summit
* The UK Prime Minister chaired an event with India's Prime Minister Modi, to launch the Infrastructure for Resilient Island States (IRIS) facility, a joint initiative with the Coalition for Disaster Resilient Infrastructure (CDRI) and Small Island Developing States (SIDS). The new IRIS fund will support small island states to develop resilient, sustainable infrastructure that can withstand climate shocks, protecting lives and livelihoods. The UK will contribute an initial £10 million to the fund, which will provide targeted technical assistance.
* 22 countries had signed a pledge to reach a 100% share of sales of new cars and vans being zero emission by 2035 for leading markets and 2040 for other regions.
* Governments agreed to set up a mechanism to help countries already suffering loss and damage due to climate change, though they did not work out the details. The pact also urged developed countries to double their collective amount of funding by 2025 to help developing countries adapt to the effects of climate change.
* More than thirty countries, dozens of states and cities, and several automotive companies agreed to work to guarantee that new cars and vans sold are zero-emission by 2035 in leading markets and 2040 globally
* More than 137 countries have committed to net zero
* New Cop26 pledges announced on methane, coal, transport and deforestation could nudge the world 9% closer to a pathway that keeps heating to 1.5C. However, current pledges made at COP26 are unlikely to limit global warming to the 1.5C (2.7F) needed to avert disastrous weather events.

# PRESS RELEASE

MCWLE

## Montserrat Joins Global Geothermal Alliance

Montserrat has just become the newest member of the Global Geothermal Alliance (GGA), being the second English-speaking to join the forty-seven-member grouping. GGA is a coalition for action to increase the use of geothermal energy, both in power generation and direct use of heat.

The GGA serves as a platform for dialogue, cooperation and coordinated action between the geothermal industry, policy makers and stakeholders worldwide.

The Alliance has an aspirational goal to achieve a five-fold growth in the installed capacity for geothermal power generation by 2030.

The main objectives of GGA are to:

- foster an enabling environment to attract investments in geothermal energy;
- provide customised support to regions and countries with geothermal market potential;
- facilitate the exchange of insights and experiences among key stakeholders in the geothermal energy value chain;
- identify and promote models for sharing and mitigating risks, in order to attract private investment and integrate geothermal facilities into energy markets.
- help streamline outreach efforts to give geothermal energy greater visibility in the global energy and climate debates.

As the newest member of the organization, Montserrat will be able to benefit significantly from the technical expertise and experience in attracting and securing financing that exist within the alliance. The support of the alliance could be instrumental in the development of geothermal energy locally.

IRENA
International Renewable Energy Agency

GLOBAL GEOTHERMAL ALLIANCE

Montserrat Energy Department


Shags
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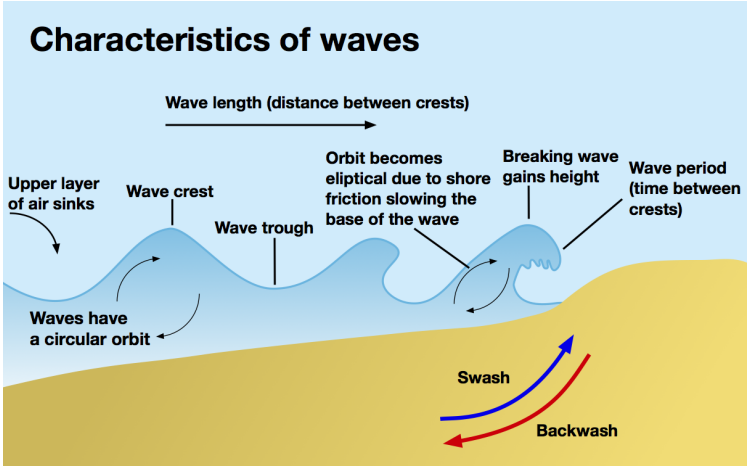
NAGICOR
LEXUS

# WAVE ENERGY

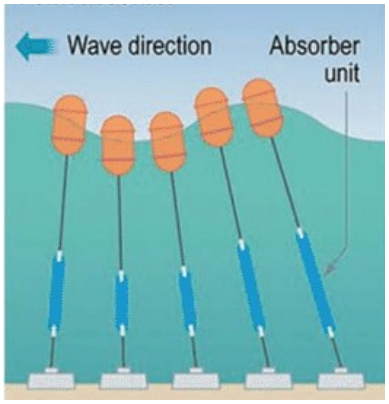
## What is Wave Energy?

Wave Energy is a renewable energy derived from harnessing oceanic waves. Waves are created by the wind blowing across the sea/ocean surface, which makes the water oscillate in circular orbits extending to a depth half of the wavelength. Wave energy is the use of kinetic energy from waves on the surface of the water or a few 10s of meters deeper.

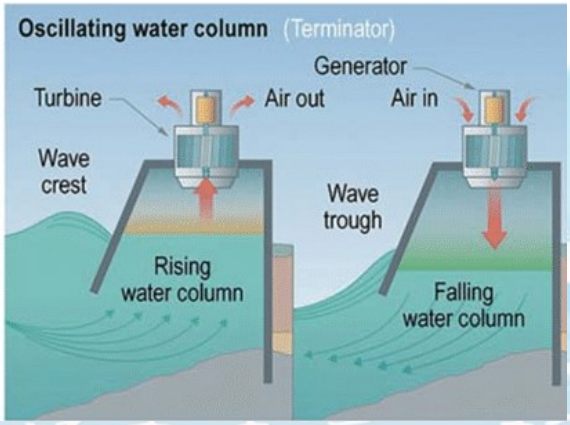


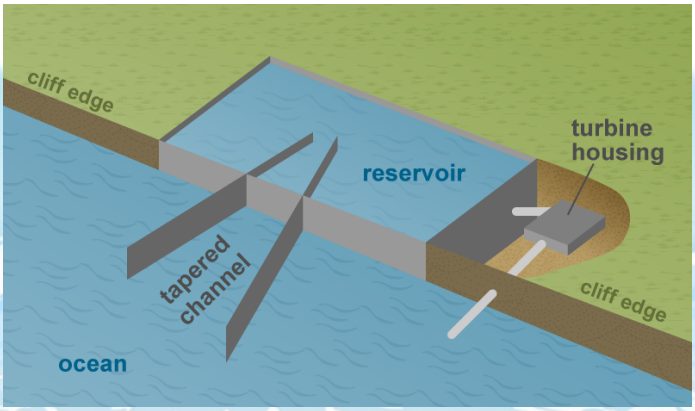

## Wave Energy: Technologies and Harnessing

Waves can be harnessed by using three basic methods:




- Float or buoy system that can be mounted to a floating raft o a device fixed to the sea-floor. These use the rise and fall of the waves to drive hydraulic pumps, which generates electricity that is transmitted ashore by underwater cables.
- Oscillating water columns use the in and out motion of waves at the shore to force air into the turbine. As the column fills and empties, the air is compressed and heats up, which creates energy. This energy is then transmitted onshore by cables.
- Tapered channel or "tapchan" rely on shore-mounted structures to channel and concentrate the waves, thus driving them into a reservoir. The water flow our of the reservoir is used to generate electricity using standard hydropower technologies.




Wave power - U.S. Energy Information Administration (EIA)

# HISTORY OF WAVE & TIDAL ENERGY

The concept of wave energy has existed since the 1800s, with modern technology being developed in 1940s. Tidal energy was used to turn water wheels and grind grain in the middle ages, and recent developments have shown it is a competitive and viable source.

The first patent for wave energy was submitted in 1799 by Monsieur Girard and his son in Paris. Thousands of patens followed , with Bochaux Praceique developing a device to power and light his home in 1910. Modern wave energy was pioneered by Yoshio Masuda, who tested numerous different devices at sea; many of which were used to power navigation lights.

Early tidal power plants used natural tidal basins. Barrages were build across the basin opening, which allowed the basin to fill during high tide, impounding it as the tide fell, and then releasing it through a waterwheel. This power was available for about two to three hours, twice a day.

La  Rance Tidal Power Station, France

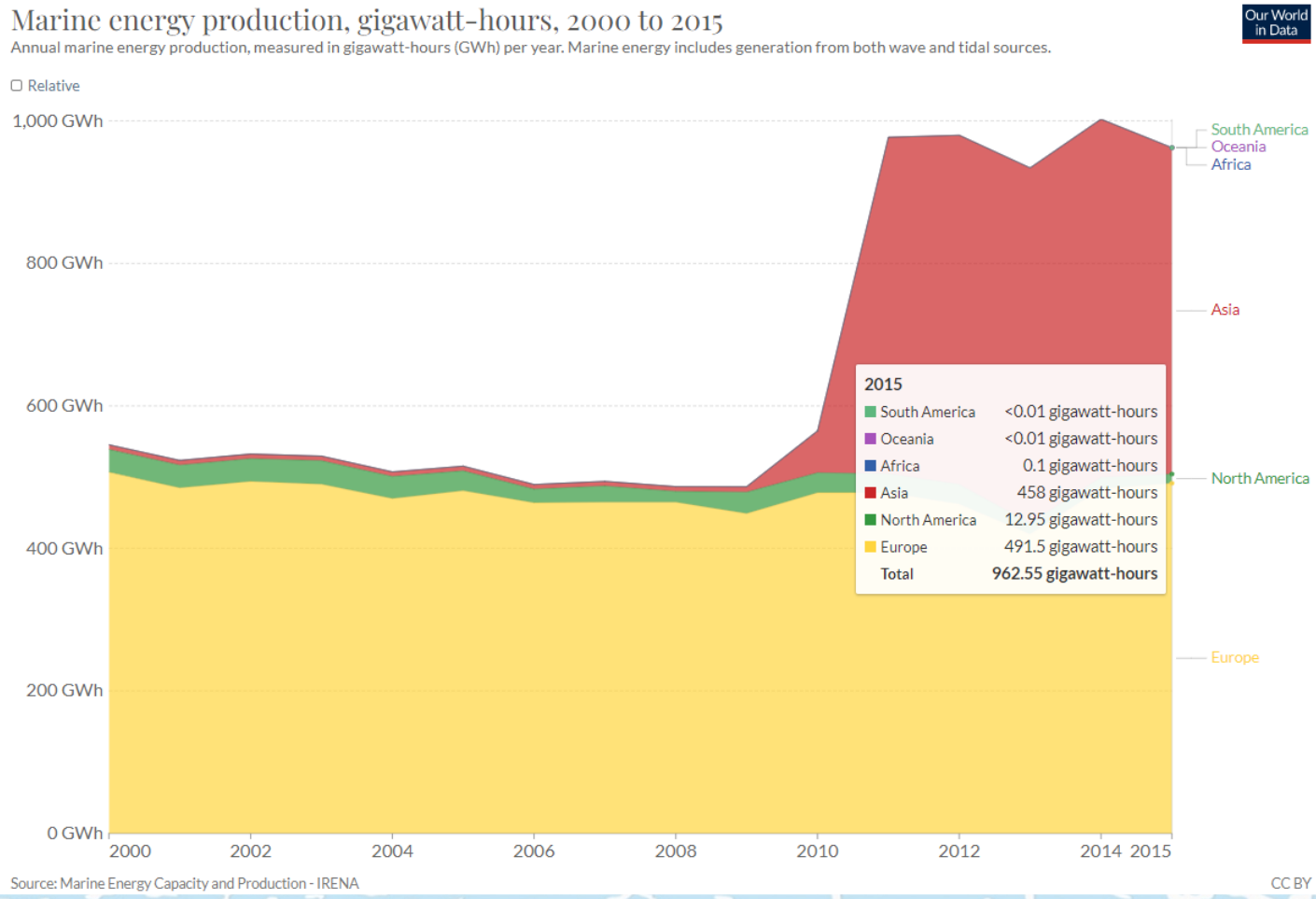
[Wave Energy | Open Energy Information (openei.org)](#)
[History of Tidal Power — Tidal Electric](#)
[Tidal Power - History of Tidal Power](#)

# TOTAL INSTALLED CAPACITY

There is an estimated 3,700GW of exploitable wave energy resource available globally. A 500kW unit was the first grid-connected wave energy device successfully operating since 2000 in Scotland. The first utility-scale wave energy project of 2.25MW, was conducted off the course of Portugal in 2008. Unfortunately, it was only functional or two months.

Global tidal energy has an estimated exploitable capacity of 3,000GW with less than 3% being located in areas suitable for power generation. Tidal energy is feasible mainly where strong tides are amplified, making it greatly site-specific. The world's largest tidal power barrage has a capacity of 254MW and has been operation since August 2011 in the Republic of Korea. It surpassed the 240MW tidal power station in France, which had been operational since 1967.

The total generation global capacity in 2015 was 962,550 MWh (1,000MWh = 1 GWh), which is assuming constant annual generation equals about 110MW capacity. The installed projects will have varying capacity factors, reducing their actual generation output.




[WOA Chapter 22 Draft (un.org)]
[Marine energy production, gigawatt-hours, 2000 to 2015 (ourworldindata.org)]
[WOA Chapter 22 Draft (un.org)]

# CASE STUDY

## Port Kembla Oscillating Wave Energy Test Station

A 500kW oscillating wave energy test station was commission in 2005 at Port Kembla in New South Wales, Australia. This project was the first fully operational archetype designed by Oceanlinx, and was dubbed greenWAVE Mk1, a shallow water energy device that capitalized on near shore transmission capabilities. At a cost of approximately $4.7 million, the Mk3 produced 500 kilowatts of power for 500 homes on the grid. A unique function of the Mk3 was that it produced desalinized water while also creating energy. In fact, the device purified 2,000 liters of fresh drinking water each day. Mk3 was located 100 meters from shore and consisted of eight floating oscillating wave column (OWC) devices. The wave energy experience at Port Kembla proved to be an important first step for the future development of wave energy technologies.

*Figure 1: The Mk3 installed device and theoretical plans for the blueWAVE device (Oceanlinx)*

# OCEAN THERMAL ENERGY CONVERSION

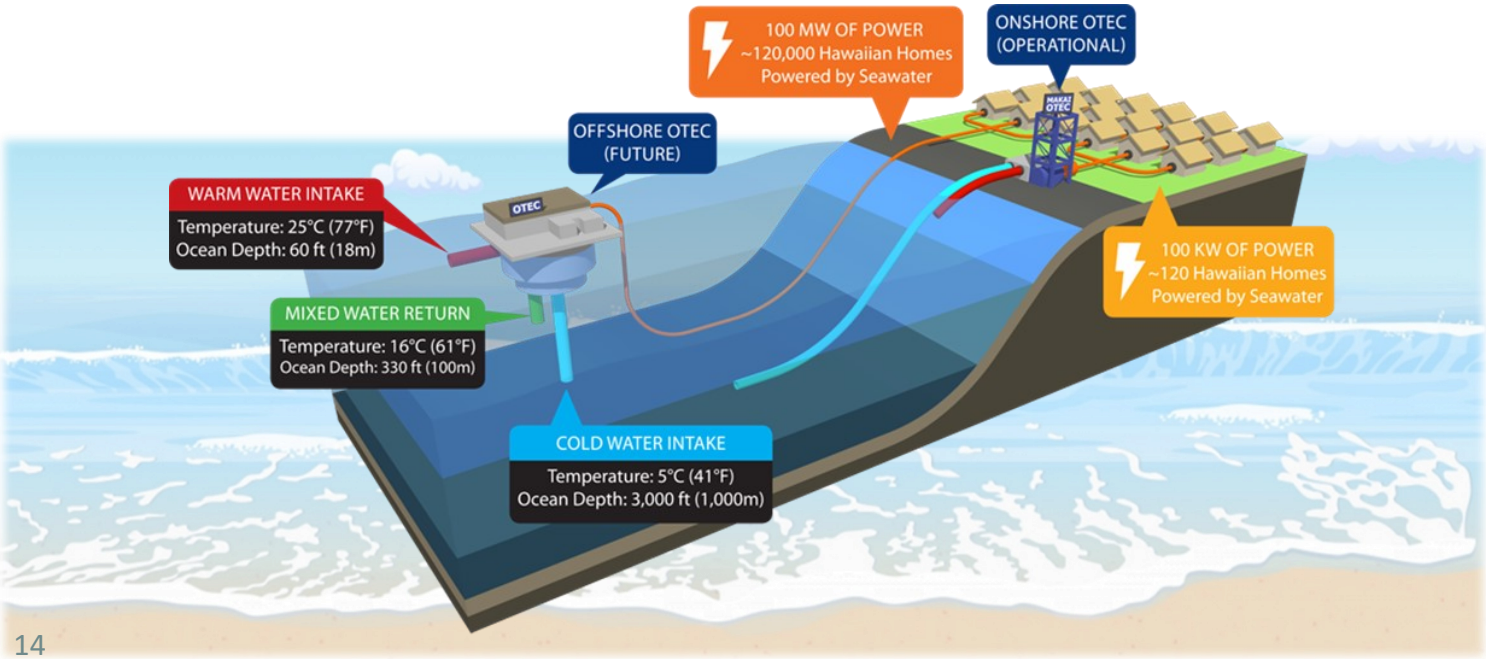
Ocean Thermal Energy Conversion (OTEC) is a process that can produce electricity by using the temperature difference between deep cold ocean water and warm tropical surface waters. The sun heats surface water of the oceans and this warm water is pumped through an evaporator containing a working fluid. This process vaporizes the working fluid, which drives the turbine. The vaporized fluid is then turned back into a fluid using a condenser cooled with cold ocean water pumped from deeper. OTEC is consistent power (24/7), a clean energy source, environmentally sustainable and capable of providing generous levels of energy.

Systems may be either closed-cycle or open-cycle. Closed-cycle OTEC uses working fluids that are typically thought of as refrigerants such as ammonia or R-134a. These fluids have low boiling points, and are therefore suitable for powering the system's generator to generate electricity. The most commonly used heat cycle for OTEC to date is the Rankine cycle, using a low-pressure turbine. Open-cycle engines use vapor from the seawater itself as the working fluid.

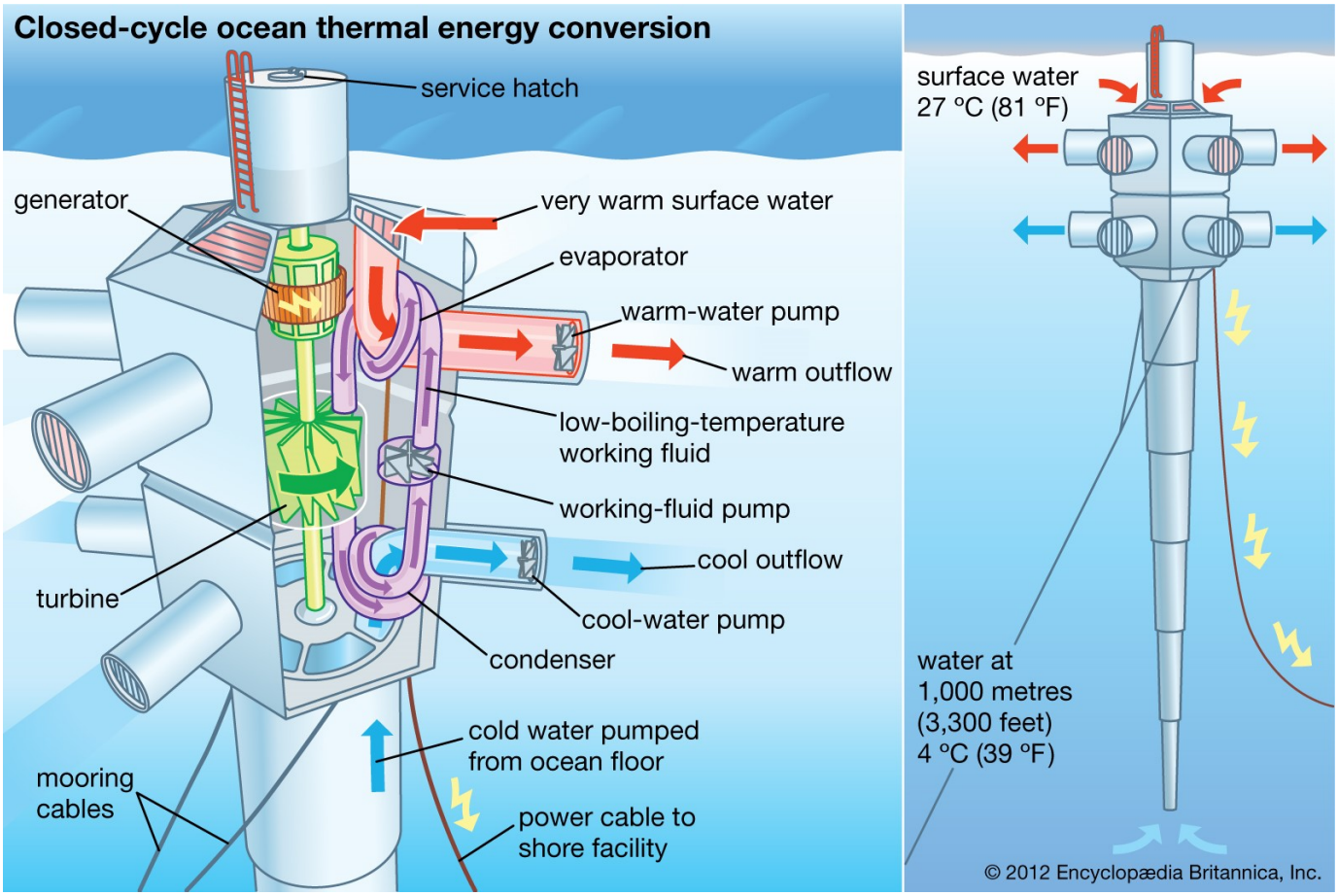
OTEC can also supply quantities of cold water as a by-product. This can be used for air conditioning and refrigeration and the nutrient-rich deep ocean water can feed biological technologies. Another by-product is fresh water distilled from the sea.

Benefits of OTEC:

- Baseload Power: OTEC produces electricity continuously, 24 hours a day throughout the entire year. Intermittent renewable energy sources are not baseload and often require storage of their energy during peak production hours for later consumption. Large, baseload OTEC plants could actually start to replace fossil-fuel-fired power plants without compromising grid stability.



- Dispatchable Power: OTEC is dispatchable, meaning that its power can be ramped up and down quickly (in a matter of seconds) to compensate for fluctuating power demand or supply from intermittent renewables. For this reason, OTEC is complementary to other renewables like solar and wind, and could enable further penetration on the grid while helping to maintain its stability.
- Security: OTEC offers the opportunity of tapping an immense energy resource that is not controlled by other nations.




# Season's Greetings

FROM THE ENERGY DEPARTMENT

Kenrick Burke

Marissa Allen

Oswen Carty

The Staff of the Energy Department, MCWLE would like to take this opportunity to wish you Season's Greetings and a Happy and Prosperous New Year. We appreciate your continued support with future endeavors.