

Motion of the ocean

Wave energy is one of the most easily available source of energy that exists and is even older as humanity. But the technology to get the energy out of the wave movement is complicated and requires complicated machines.

Wave energy in the past

France started implementing wave energy into their system in the late 1790 as the first country in the world.

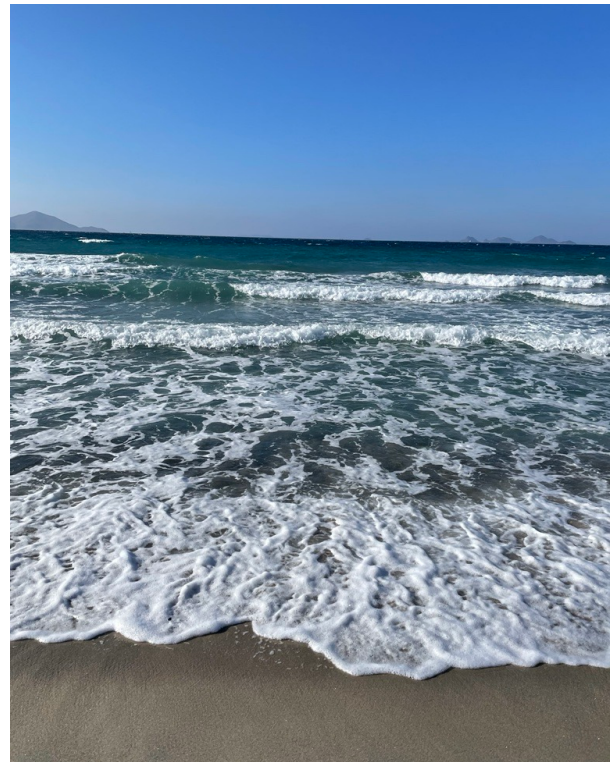
Later people in the UK started lightening their homes with the help of wave energy but then the implementation got harder and people depended more on artificial energy like oil.

But because of the oil crisis people searched for alternatives again.

The founder of a wave energy machine Salter duck was the only one succeeding in terms of wave energy. But peoples interest shifted towards energy out of oil again because the crisis reduced again.

How do we use wave energy today?

Researchers are increasingly looking for renewable energy sources. One of them is wave energy. Unfortunately, compared to solar or wind energy, it can only generate electricity in small quantities. The problem lies in the systems that convert the waves into energy. They are not yet sophisticated and therefore usually very small and unpopular. Another problem lies in the different properties of a wave. Depending on how long or high and with what force it breaks, decides the amount of energy products. Eppe and tide must be factored into the system, as well as wind and possible earth ruptures in the ocean. Similar to solar energy, the amount of energy produced depends on the weather. Wave energy, however, would be very climate-friendly and, unlike fossil fuels such as oil or coal, produces virtually no CO₂. But technologies to harness wave energy are still developing. In Switzerland this kind of energy production is not possible, because we are a landlocked country.



Wave energy and the global energy crises

The war in Ukraine has driven up oil prices. The pandemic is still causing delays or even stoppages in the delivery of raw materials. Therefore, we believe that now is exactly the right time to pay attention to wave energy. The potential of this renewable energy is very high. Our planet, also known as the "blue planet" has huge amounts of water. Why don't we extract our needed energy from it and in a CO₂ neutral way to boot? This form of energy is exhaustible. In 2050 we could reach the net-zero world if we increase the energy that can be extracted from the sea by 33%. It is even possible to one day supply the world only with wave energy. For us, this is a goal worth striving for.

Calculation

Basis: Master - Arbeit
von Stefan Tinnhäuser
; Wellen Energie und ihre Nutzung

potentielle Energie → beruht auf Druckunterschied zwischen Wellenberg und Wellental.

Formel für seine Berechnung: $P = 3060 \text{ kg s}^{-3} \text{ m}^{-\frac{3}{2}} \cdot A^2 \cdot \sqrt{\lambda} \cdot L$

⇒ Nordsee: 13.3 kW pro Meter Wellenfront

($A = 0.75 \text{ m}$; $\lambda = 60 \text{ m}$)

Stadt Zürich: Bedarf/pers.: 6354 kWh / Jahr 2020
Einwohner: 402'762 Pers (Stadt Zürich)

$6354 \times 402'762 = 2.55910 \times 10^9 \text{ kWh / Jahr Stadt Zürich}$

$2.55910 \times 10^9 \text{ kWh} : 13.3 \text{ kW} = 192'417'274 \text{ m}$ (Wellenlänge benötigt)

$192'417'274 : 1000 = 192'418 \text{ km}$

Um die ganze Stadt Zürich zu versorgen,
benötigt man eine Welle von einer Grösse
192'418 km.

Vergleich:

Umfang Welt: 40'047 km
Wellengrösse: 192'418 km

$\frac{192'418 \text{ km}}{40'047 \text{ km}} = 4.81 \times \text{um Welt}$

↳ Die Welle würde rund 4.81 mal
um die Welt gehen.

Sources

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[Wave energy today](https://justenergy.com/) (justenergy.com)

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