

International Creation Technology of Magcycle Project

Conventional problem.

«Matters necessary to the creation ocean business»

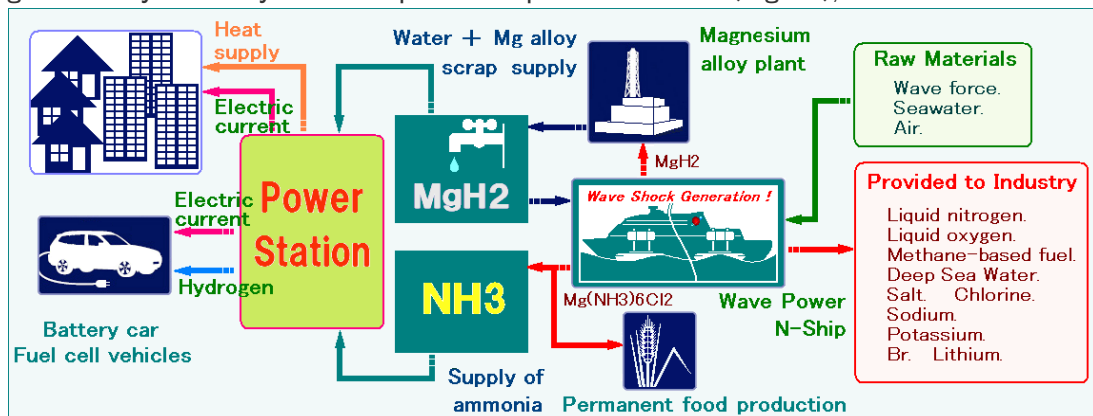
- (1) To change ocean huge energy into electricity., And the ability to self-run (standstill / movement).
- (2) To recover the resources of the ocean., Or to be immobilized.
- (3) To recover metals from minerals of the ocean seabed., And to the effective use of waste.
- (4) To produce food in the ocean.

The challenge is a lot of renewable energy secure "Storage/ Transport/ Reproduction of hydrogen / Use".

"On the deep sea, mooring and the electric transmission of the electric converter are impossible. Mass electricity storages are not possible even if transmit electricity. A storage of a large quantity of hydrogen is not possible even if transport hydrogen."

We solved this difficult problem.

A settled method is the conversion storage of the renewable energy, and magnesium circulation-use methods. Magnesium hydride method developed so far. Hydrogen control / power generation method, using magnesium hydride. By N-Wave power ship & Bitter-salt ($MgCl_2$), it comes true alone.



According to the working papers of NEDO, "On the shallow sea, wave power generation has been made in equipment and fixed mooring. On the deep sea, mooring and fixation are difficult.", is mentioned.

In other words it is not possible for the use of the electricity that converted on the large ocean in the technique conventionally.

The function of the N-type wave power generation device solved "Hydrogen production and storage. And ocean transportation." by the renewable energy.

<A record of NEDO <http://www.nedo.go.jp/content/100107274.pdf>>

Integration system technology becomes indispensable for the circulation use of the ocean resource.

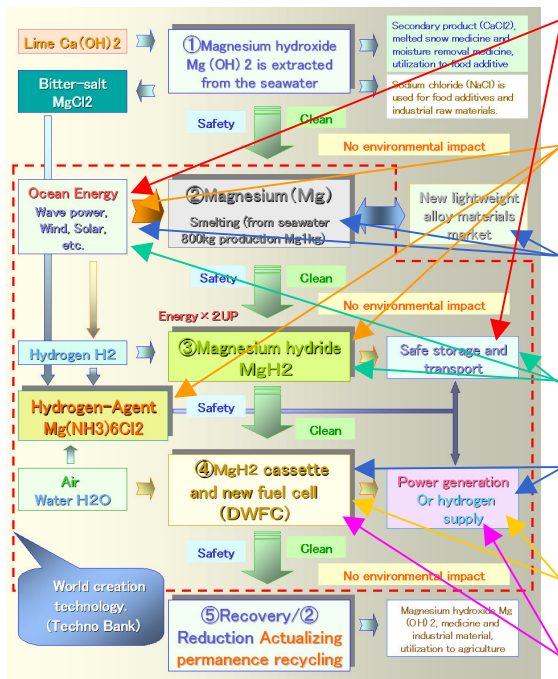
Electric conversion technology of the wave force.

Technology to convert electrical energy to the material, and storage / transport.

Technology to use safely in industry and general life.



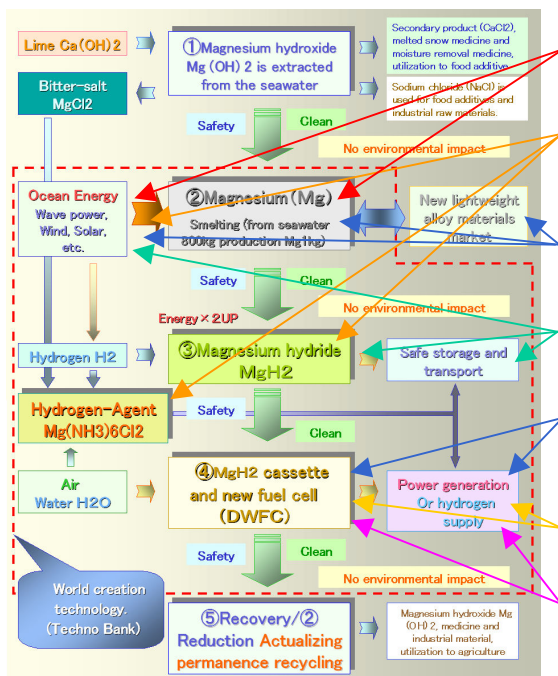
(1) Whole of creative technology is as follows. <Integration technology of Magcycle Project>



- The electricity of the ocean energy and conversion to the thrust.
- Energy storage and hydrogen production by the natural energy.
- Magnesium on recycling or smelting by the natural energy.
- Metal hydrogenation by the natural energy.
- By magnesium hydride or magnesium, hydrogen of production and control.
- A fuel cell using magnesium / magnesium hydride.
- Using magnesium hydride, rechargeable batteries and primary cells.

* Critical technology of Magcycle Project is N-type wave power generation device. At present, there is not electric conversion technology of the ocean energy on the deep sea. Therefore, all technological using electricity in the ocean are unified with a ocean power supply method, and the technology is established.

(2) The whole of the field of business is as follows.



- Wave power ship, Mega-Float, others.
- Ammonia, Electricity / Energy, Trade, others.
- Magnesium, Trade, others.
- Electricity / Energy, Trade, others.
- Airplane / Car / Motorcycle, Electric machine, others.
- Battery, Fuel cells, others.
- Trade, others.

* In addition, a field of Train, Vehicle, Machine, and Building etc.

■ The industry use to change.

1. Wave force + bitter-salt(MgCl2) the dominate ocean industry.



The total amount of wave energy, the amount of total power consumption is 500 times more than the world.

The great wave power, is open year round. In addition, the high energy density per area.

Wave power N-ship, that advance, caught the wave to a lot of power efficiency. Not waiting for the waves. Compared to waiting for the wave, difference is a whopping 3 times.

The main resources which wave power N-ship produces during a voyage are as follows. Hydrogen, Nitrogen, Oxygen, Ammonia, Deep-ocean water, Salt, Chlorine, Sodium, Magnesium, Potassium, Bromine, Lithium. This enabling technology is in the control unit. The control unit functions like the suspension of the car.

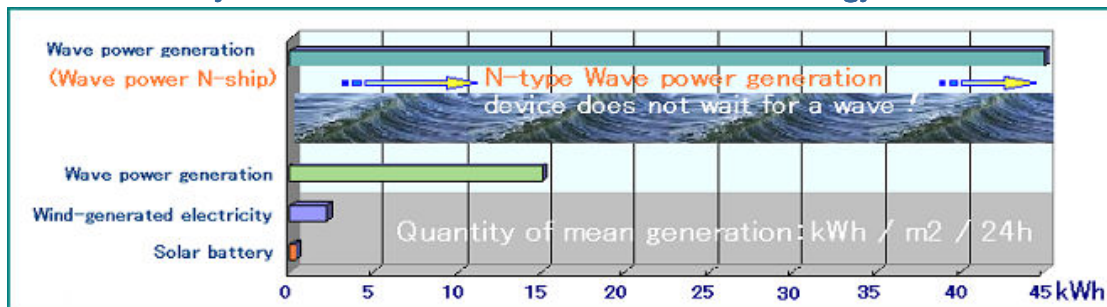
<Power output per unit area>

● Wind power generation × 20 times. ● Solar power generation × 150 times.

*Movement of ocean waves can be seen.

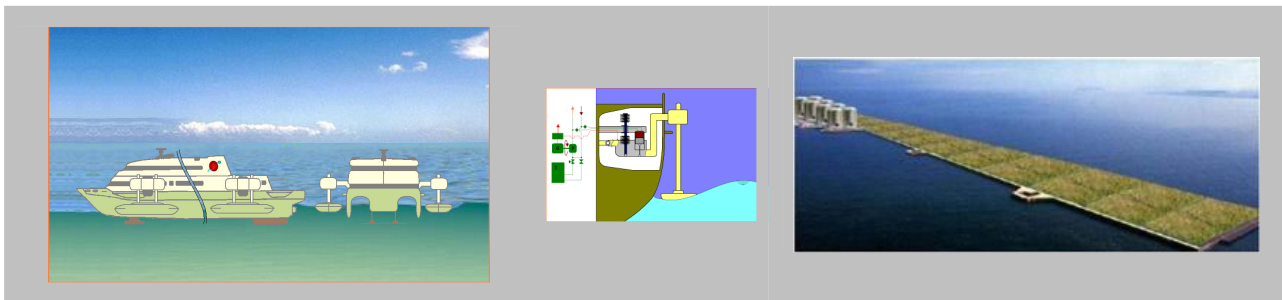
(http://www.j-protium.com/business/Strongest_Force_Ocean_eg.ppt)

<Quantity of electric conversion of the renewable energy /m² /24h>



In the next generation, the ocean resource is important. And a N-type Wave power generation device becomes indispensable.

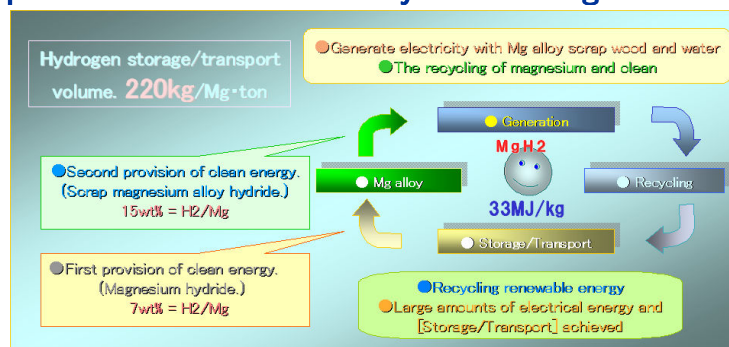
Renaissance, a cheap electricity cost by the renewable energy is the source. [2 JP yen/kWh]



Wave power N-ship please visit here: ▼

http://www.techno-bank.co.jp/company/eg_guidance_CO2_reduction_ship.pdf

2. “MgH₂”. The power station is a factory of the magnesium alloy.



A good point of the power station by the magnesium is that supply of the clean electricity and an alloy of the magnesium and the production of raw materials are possible. In addition, radioactive pollution and CO2 emissions do not have a relationship with.

Magnesium hydride(MgH₂), the first use is to achieve efficient industrial use.

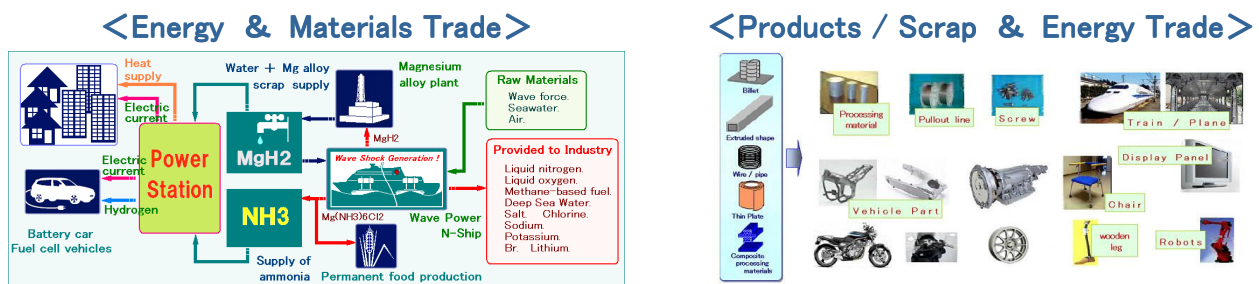
Extract hydrogen (H₂=7wt%/Mg) from magnesium hydride(MgH₂), used for **power generation**. Then, magnesium(Mg), magnesium alloy manufacturing.

The first use of magnesium alloy scrap is used for hydrogenation of magnesium alloy.

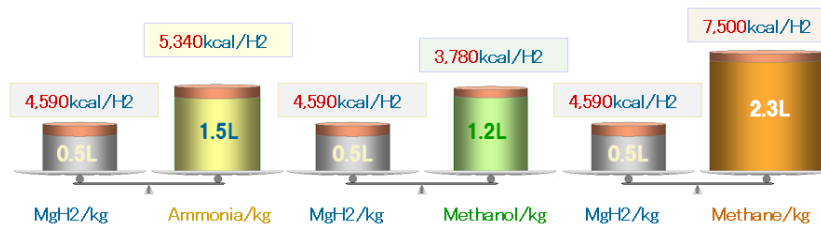
Manufactured goods, DWFC hydrogen generation (H₂=15wt%/Mg) as a material to use.

In other words the recycling of the magnesium can do two times of offers of the hydrogen.

● **Trade changes.** (Magnesium with the added value of energy)



<Transportation comparison with the next generation energy.>



(Heat of combustion of MgH₂, DWFC a case. Methanol and methane, heat of combustion of carbon is omitted.)

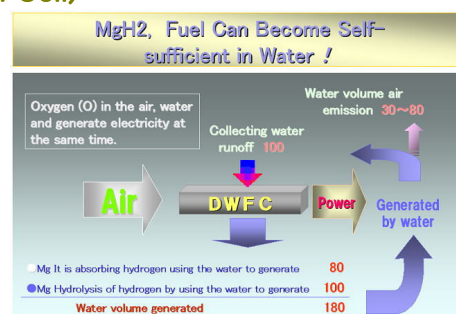
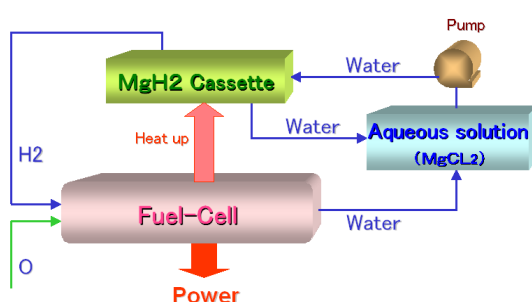
3. "MgH₂". Only air supply. The plane will fly, cars are run.

The figure under the new fuel cell DWFC (Direct Water Fuel Cell) shows how to generate water. Cassette inside source of hydrogen filling (MgH₂). The new fuel cell, and cell consists of a combination cassette. The new fuel cell, hydrogen and air to create by water. Fuel and water are made.

MgH₂ generates hydrogen by hydrolysis. Discharge hydrogen breathing at the same time. The fuel cell generates electricity by hydrogen and air. In this case, in comparison with the quantity of water that is necessary for hydrolysis, about 2 times water is made.

Therefore, Water does not need to prepare.

● **Structure of new fuel cell DWFC (Direct Water Fuel Cell)**



Compared to gasoline, the natural energy use that an fuel efficiency per the weight doubled was enabled. The fuel cell-powered car runs 600km by a tank of 40kg/MgH2. 80kg/MgH2 in 1,200km can run.

This is the world's first ultimate technology that only DWFC can make.

Open technology: April 2006. Fuel cells April issue 126. (Fuel Cell Information Center).
<http://www.fcdic.com/ja/kikanshi/VOL5-4.pdf>

Motor Vehicles 600km to 320 yen.

"Magcycle Project", to generate electricity in a magnesium alloy debris. As a result of electricity generation, the raw material to produce magnesium. Fuel cost for power generation. from the price of magnesium alloys, to deduct the purchase price of scrap magnesium alloy, power generation fuel bill basically does not occur.

(Technical details: www.techno-bank.co.jp/)

Comparison of production costs.

- Magnesium hydride (600km = 40kg/MgH2) > **320 yen**
- Gasoline (600km = 80kg) > **4,640 yen**

Circulation use of magnesium is the creation of new industries. And the economy grows steadily, too.

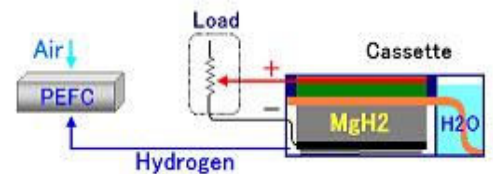
- ① Use of seawater resources.
- ② Use of bitter-salt (MgCl2).
- ③ Trade of natural energy.
- ④ Use of hydrogen energy.

Global Environmental Renaissance, an electricity cost by the free renewables energy is a key !

4. "King of quiet generator", Magnesium battery !

MgH2 magnesium battery is used, the characteristics that are superior compared to other battery. It is world champion.

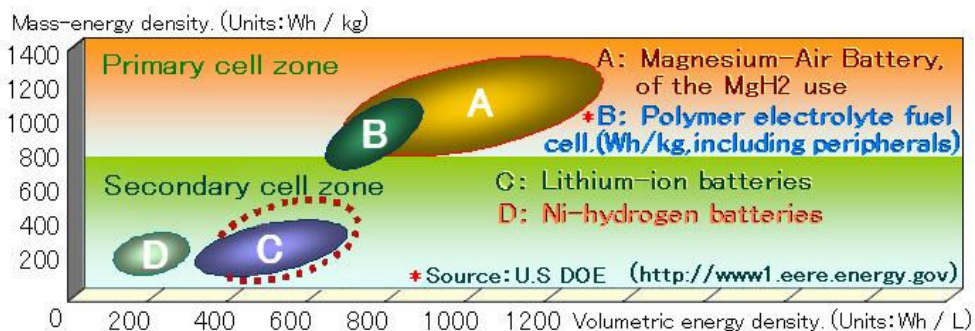
In addition, to a champion, a stronger fair wind blew. It is an appearance of PEFC which it does not use platinum for.



Cathode "Source of Hydrogen (MgH2)" is used. The air anode use the new fuel cell. "Source of Hydrogen (MgH2)/kg," the amount of energy is 9.1 kWh.

From this energy, electric conversion more than 4.5kWh is possible. (For example, thermal power generation by fuel A-oil /kg is electric conversion of 3.8kWh from energy of 12.7kWh.)

The power density of < 1200Wh/kg. This is a lithium ion battery (< 500Wh/kg) twice.



Magnesium, atomic weight 24.3, Specific gravity 1.74, The weight of a mole. 24.3g.

Faraday constant $F = 9.65 \times 10^4$ Biquadratic C / mol as.

Electric charge per 1g,

$$9.65 \times 10^4 \text{ Biquadratic} \times 2 \text{ (Electric charges)} \div 24.3 \doteq 7880 \text{ Coulomb}$$

$$7880 \text{ Coulomb} \div 1 \text{ hour (3600 sec)} = 2190 \text{ mAh}$$

$$2190 \text{ mAh} \times \text{Specific gravity } 1.74 = 3.8 \text{ Ah / g}$$

On the other hand, lithium 3.86 Ah / g. As for both, the magnesium and the lithium, ability is about the same.

● The battery of the next generation becomes the monopoly of the magnesium.

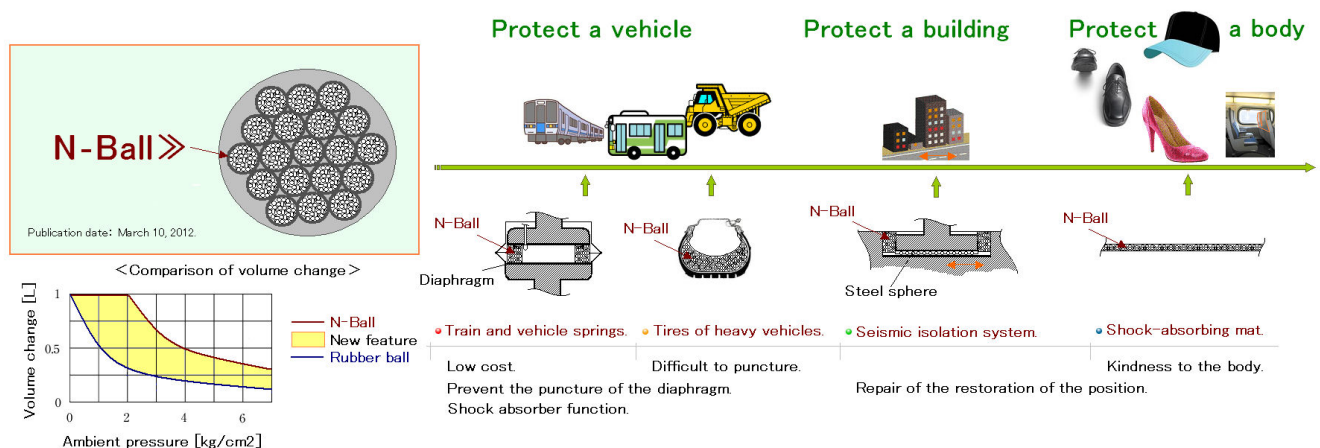
The reason, first, the magnesium is 2 an electric charges. Magnesium, it is inexpensive. There not being the drying up of resources.

Furthermore, quantity of generation doubles when using MgH_2 . Hydrogen adhering to magnesium is caused by this. For increase is quantity of generation by the hydrogen. (**Highest in the world**)

If the secondary battery are an absolute advantage in safety. (Next generation magnesium rechargeable battery: A domain to show in the dashed line of the graph.)

It is also superior compared to the polymer electrolyte fuel cell. Hydrogen fuel storage / supply device is not required.

5. Use of the material accumulated.

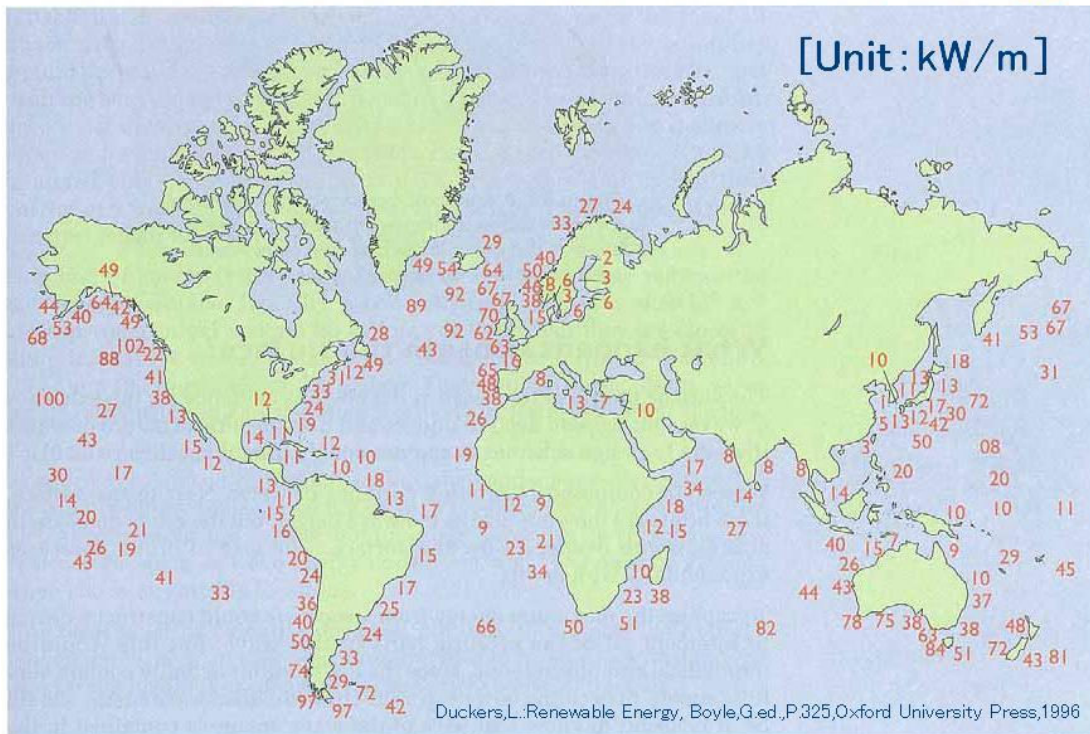


■ 「Global Environmental Renaissance」 proposal for.

1. The existence of the wave force.

It is distribution of the world wave force energy. The key to future energy can understand that it is wave force.

Extensive Distribution of Renewable Energy



< 570 billion kW in untapped wave power : Total power consumption of the world's 1.2 billion kW >

Wave height [m]	1~2	2~3	3~4	4~5	5~6	6~7	7~8
Estimated wave energy [kW/m ²]	10	30	60	100	150	210	280

[Duckers,L.:Renewable Energy, Boyle,G.ed.,P.325,Oxford University Press,1996]

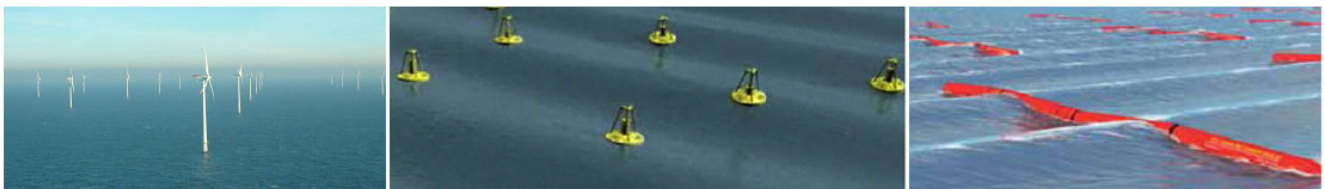
2. "Wave force – electricity conversion systems," Current Issues

(1) A marine generation system

The shallow marine electrical generator which crowd off the coast.

(The source is a public document.)

From the left : Wind-generated electricity system. Generation system of buoy-type. Pipe-type power generation system consolidation.



A problem : Has been proposed by way of the mooring rope or chain. This approach to heavy abrasion, cutting the lead to a short period. The accident of the marine transportation is worried about. In addition, affect fisheries.

It is necessary to endure a surge of 5-7m to get electricity on the ocean. In addition, a large amount of power 'Storage / Transport' should be.



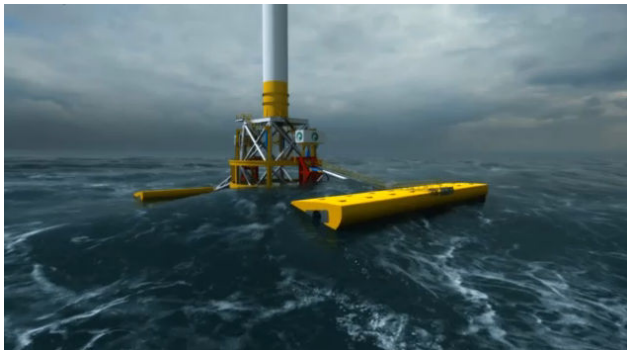
(2) Stationary wave power generation systems

Installed in the shallow offshore "Wave Treader". (The source is a public document.)

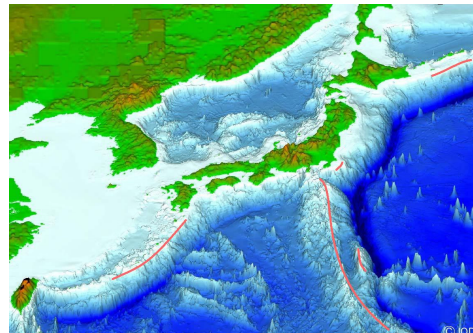
Problem of Deep Sea: Tower, mooring, power transmission line, is impossibility. There is the destruction by the big wave, too.

The limit of the setting area. In the case of marine Japan, there are little setting places.

Wave Treader



Japan's ocean power generation area. (The red line area.)



(3) Mega-Float

Mega-Float, a technique to reduce the elastic response is important.

N-type Wave power generation device, as a vanishing wave crest, then converted into electricity by absorbing wave energy. This rational technique is indispensable for the ocean energy era.

3. "Global Environmental Renaissance" to the proposal

1. Energy.

From energy (Fossil fuels and uranium) of the environmental disruption type change it to energy of the environmental safeguard type.

For the future, effective use of renewable energy in multistage.

2. Drinking water and food.

Water conversion of the seawater. And, even if fossil fuel dries up, providing ammonia. (Ammonia is essential for agriculture. As for the immobilization of nitrogen, only ammonia is possible.)

3. Cyclical use of resources.

Environmental destruction-free collection and recycling of seawater resources.

The next generation of energy needs to be environmentally friendly and renewable as well as safe and convenient.

The natural working takes time of hundreds of millions of years, and it is selection, and there are current natural environments.

On the other hand mankind, desertification was cut down forests, and also left pollutant. It is convenient for people at the "intelligence" is the result of using a sieve.

In addition, anyone recognizes that it is necessary for the revival of the global environment to stand up now. For the next generation, it is necessary to follow providence of grand nature on a global scale.

"Magcycle Project" has to unfold based on international understanding from a beginning, from the point of view.

As a result, the outcome will be reflected in all the country's economy.



< Comment of the developer >

Nobuyoshi Tsuji (1949, born in Japan.)

Global environment maintenance is set by the technology that I developed, and equalization of the international economy expects that it is possible because international industry is activated. It is time when peace comes.

http://www.techno-bank.co.jp/technology/Overview_tsuji.pdf

