

Renewable Energy and Self-Reliant Distributed Networks

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Characteristics of Island Region Energy

- Distributed systems
- Utilization of regional resources such as renewable energy, etc. is effective
- Possibility of supply depots

Japan's Three World-Class Energy Technologies

- Key technologies for widespread adoption of renewable energy and construction of distributed networks -

- **Clustered local network**
- **Bellsion Wind Turbine**

(References)

*Tuna-shaped tidal power generation turbine

(Maguro turbine)

* Mechanical wave power generation system

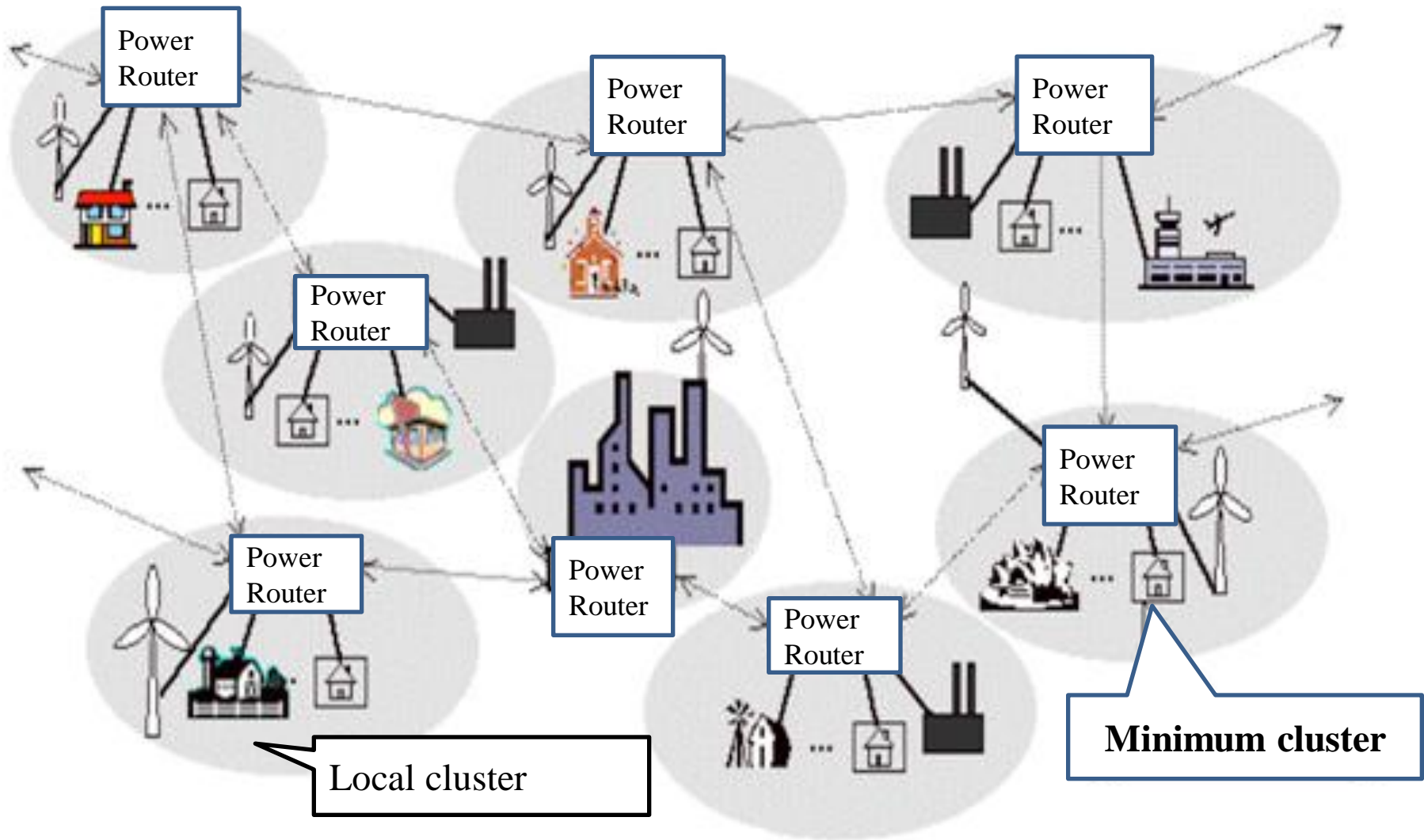
(developed by Mitsui Engineering & Shipbuilding, Mitsubishi

Heavy Industries Bridge & Steel Structures Engineering Co., Ltd.)

1. Clustered Local Network "The Smart Grids"

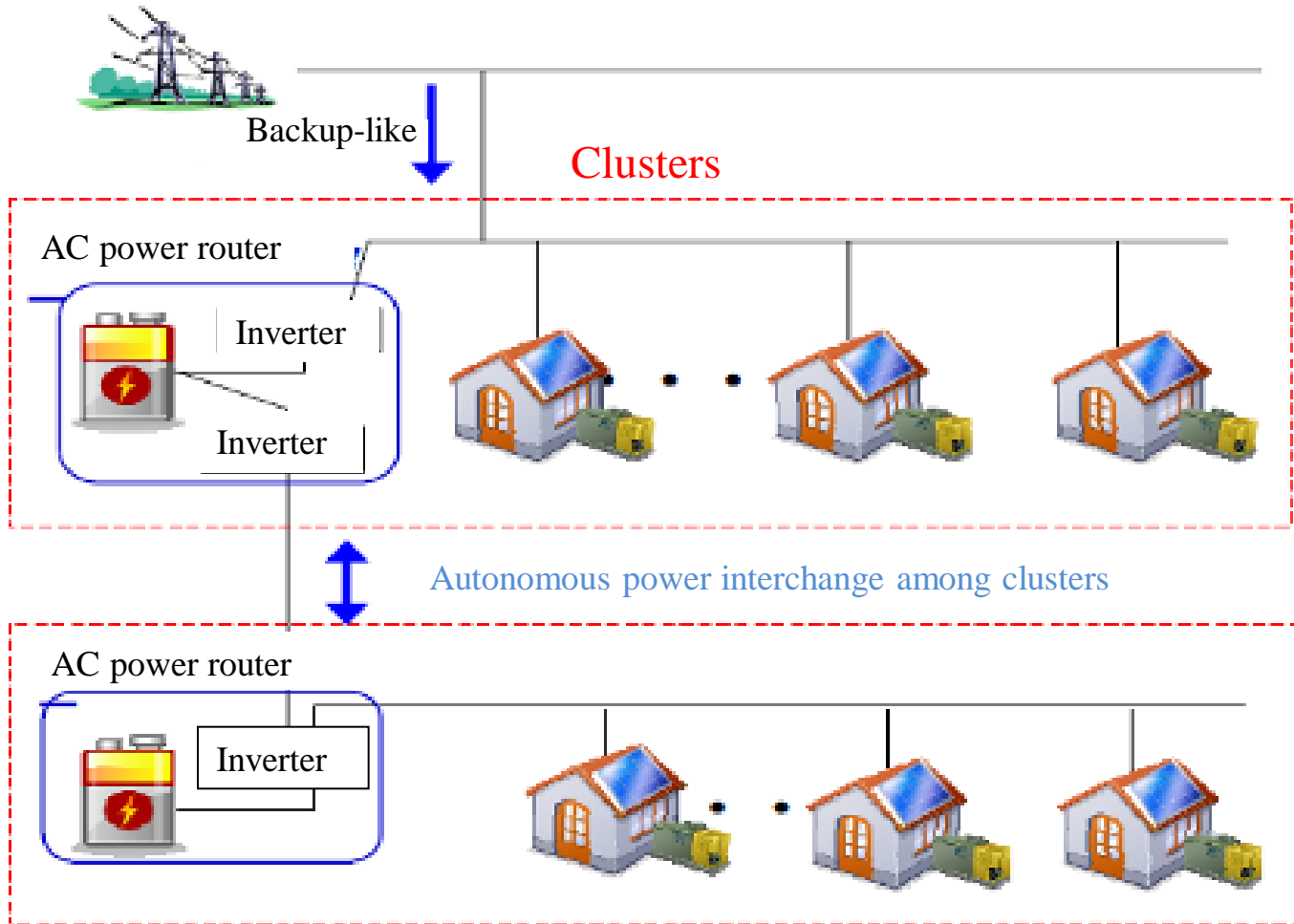
- **Systems based on the new concept of the interchange of the excess and shortfall of power among entities and among groups**
 - * **Earth friendly system able to accept more than 50% of required power from renewable energy without system stabilization**
 - * **Disaster-prevention and highly secure system independent from blackouts**
 - * **Low-initial-investment, scalable and simple system that developing countries can use easily**

Concept of Electricity Cluster Oriented Network (VPEC)



(Source) VPEC Co. Ltd.

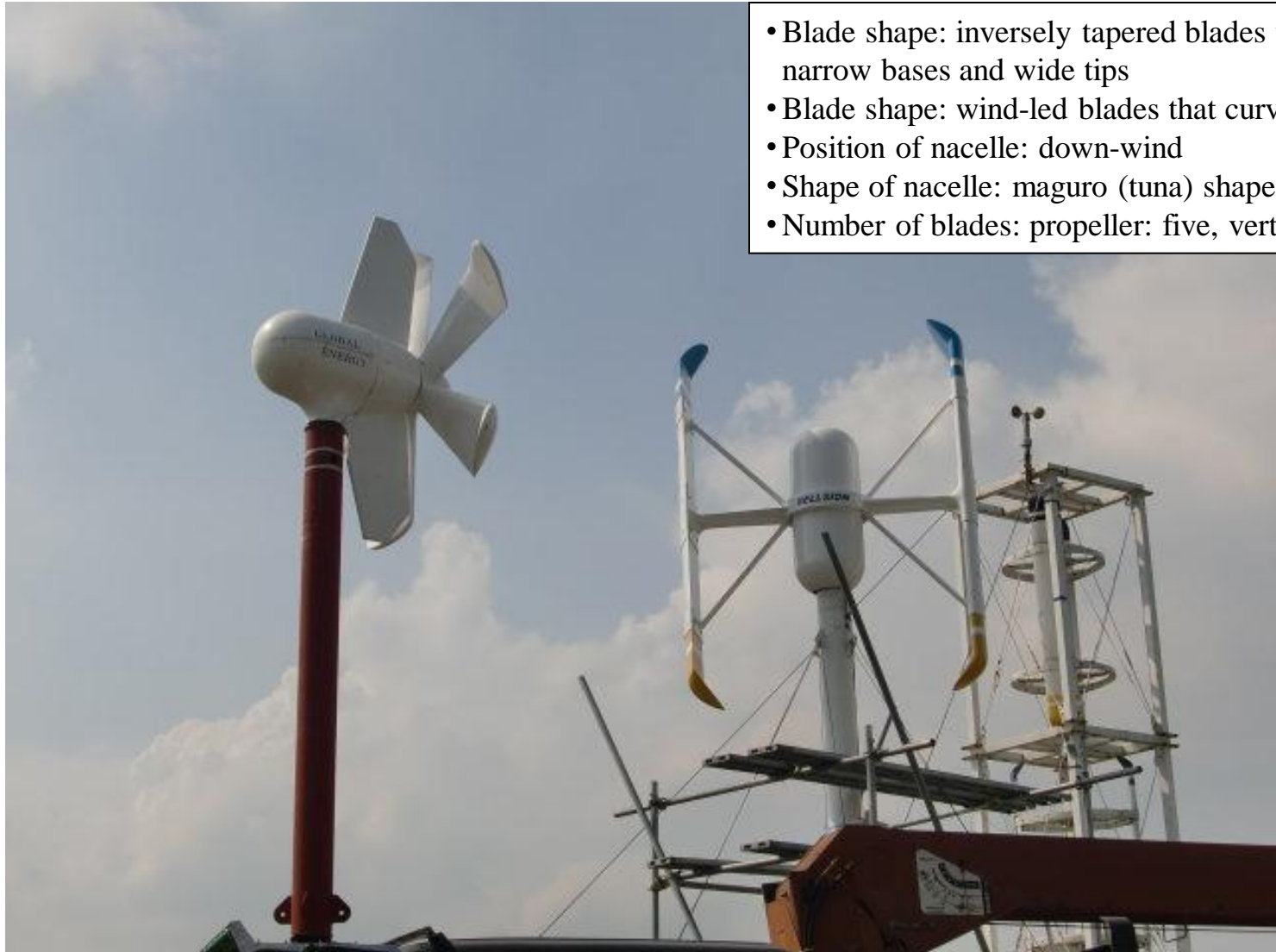
Excess and Shortfall Interchange Systems Using Power Routers



2. Bellsion Wind Turbine

- **Developed by Global Energy, a venture company which has its research institute in Tochigi Prefecture**
- **Hydrodynamics Innovation: Overcomes conventional scientific wisdom by adopting a design which uses resistance as energy**
- **Wind Turbine innovation**
 - * **Low-speed start-up, strong inertia, high utilization rate**
 - * **Low noise**
 - * **Pass-through wind turbine surfaces, little interference between wind turbines**
- **Applicable to waterwheels, propellers, tidal power generation turbines, flying boats**
- **High efficiency even in small or mid-size → harnesses wind power as local power generation**

Bellsion Wind Turbine



- Blade shape: inversely tapered blades with narrow bases and wide tips
- Blade shape: wind-led blades that curve inwards
- Position of nacelle: down-wind
- Shape of nacelle: maguro (tuna) shaped
- Number of blades: propeller: five, vertical: two

Photo by author on July 2011 at Tohigi Research Institute of Global Energy

Bellsion Wind Turbine Demonstration Project on Hachijo Island



(Source) Tokyo-MX-TV

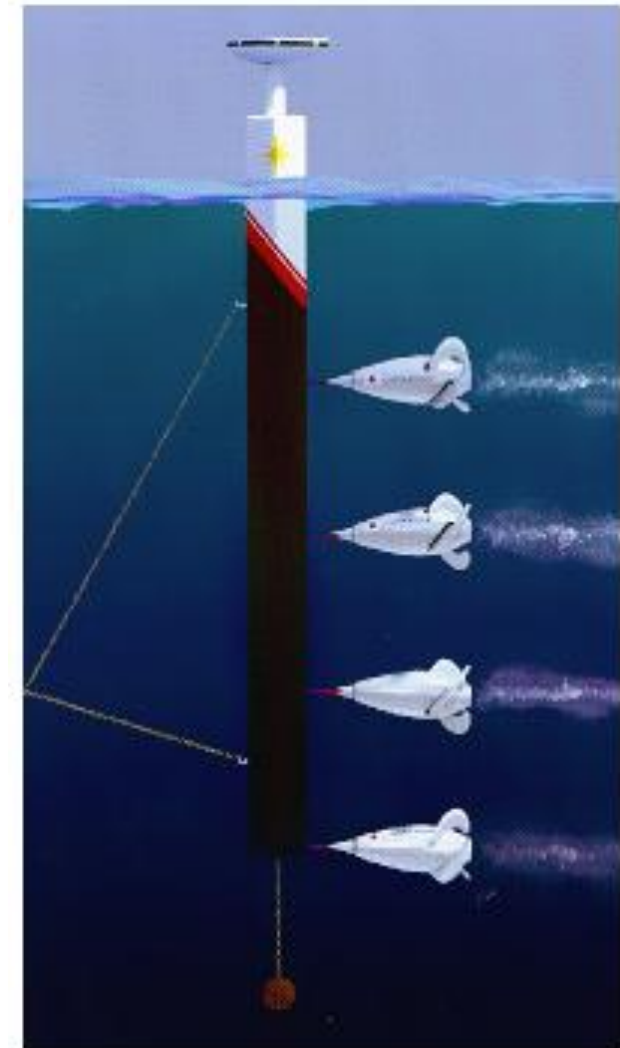
(Reference 1) Tuna-Shaped Tidal and Ocean Current Power Generation Turbine

2000kW tidal power generation

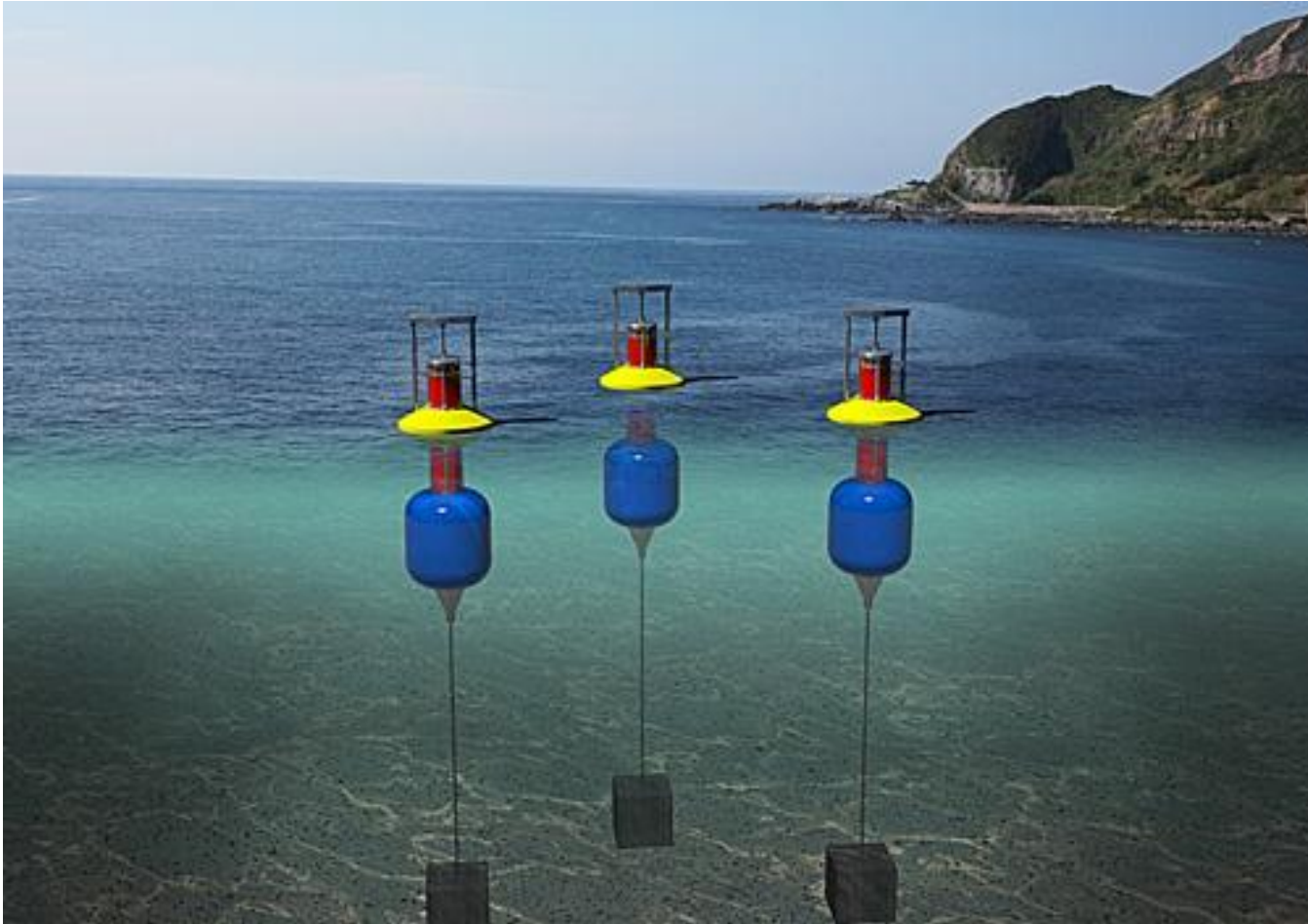
NT030 Maguro Turbine



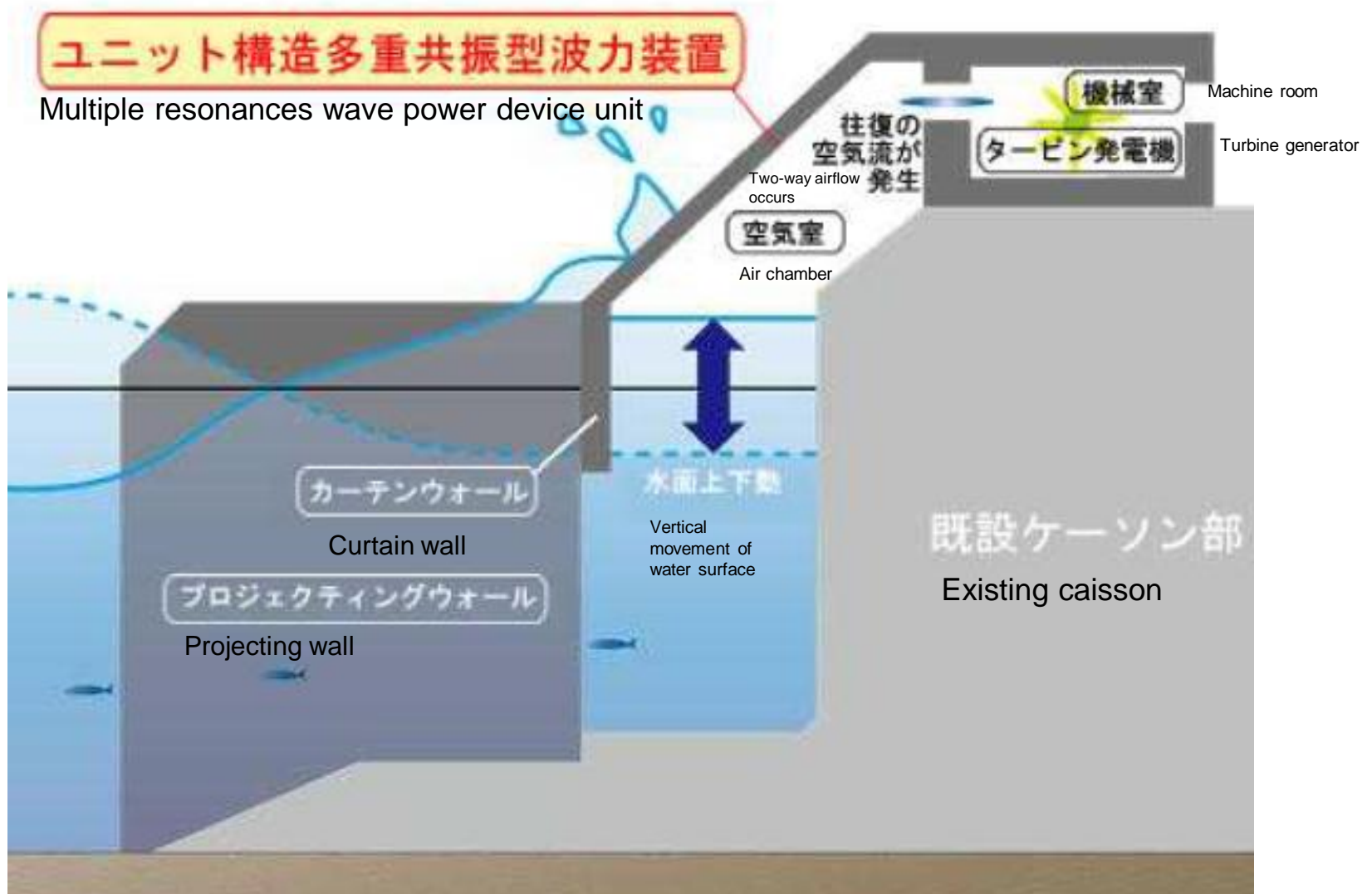
(Source) Nova Energy web site



(Reference 2) Mechanical wave power generation system being developed by Mitsui Engineering & Shipbuilding



(Reference 3) Pneumatic wave power generation system of Mitsubishi Heavy Industries Bridge & Steel Structures Engineering



(Source) Mitsubishi Heavy Industries Bridge & Steel Structures Engineering Co., Ltd. press release

Thank you for listening.