

# **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

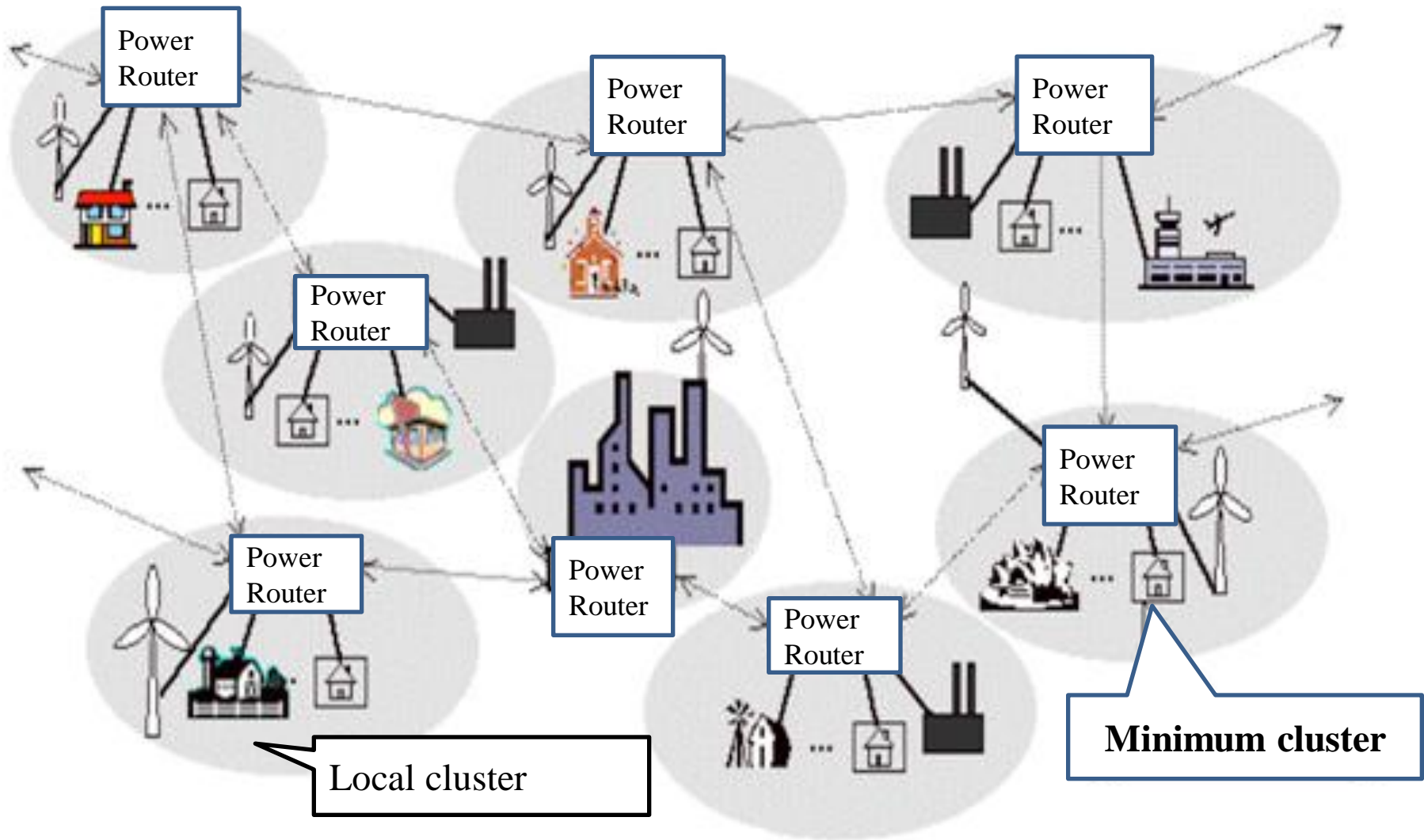
(developed by Mitsui Engineering & Shipbuilding, Mitsubishi

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

# **1. Clustered Local Network "The Smart Grids"**

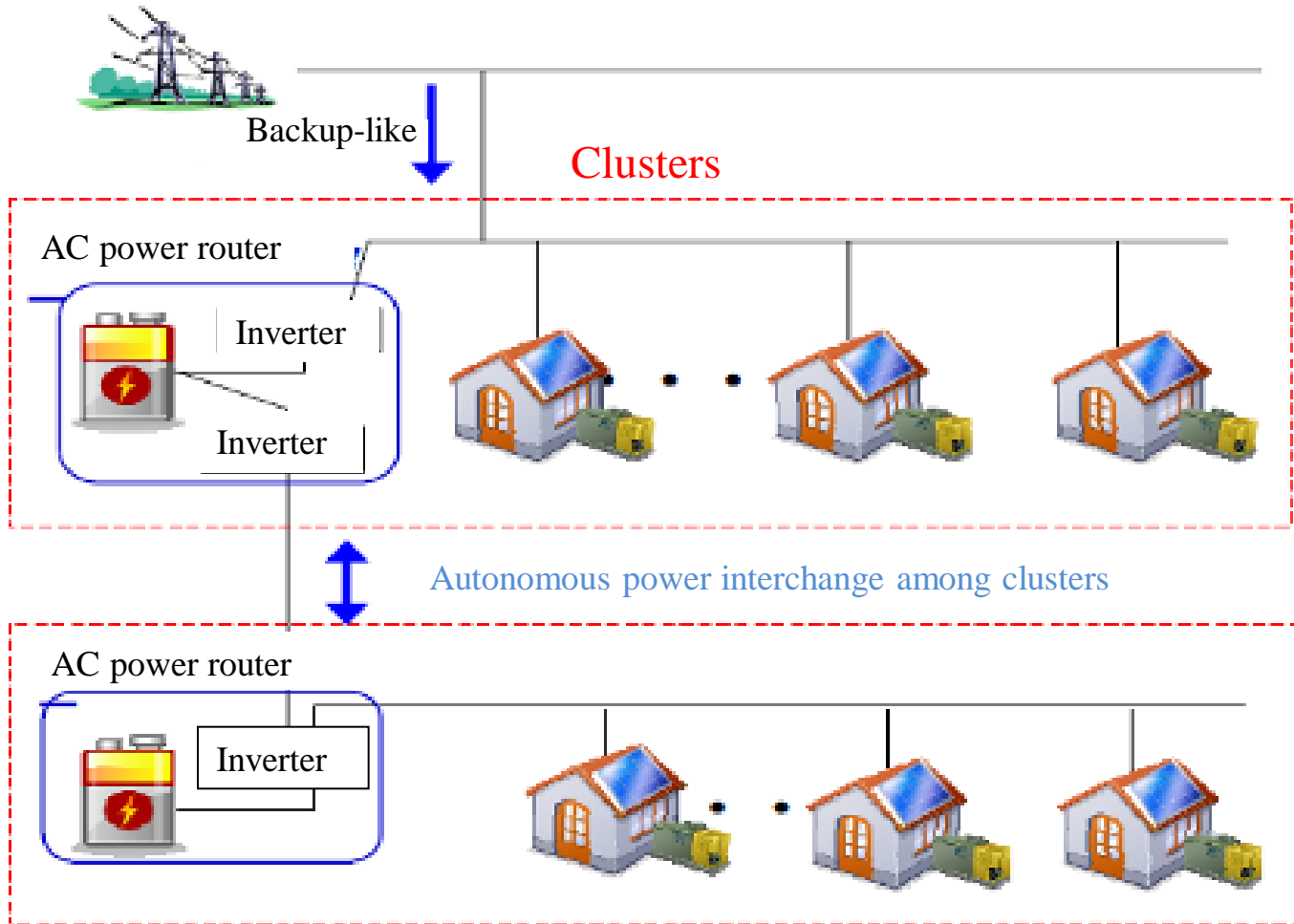
- **Systems based on the new concept of the interchange of the excess and shortfall of power among entities and among groups**
  - \* **Earth friendly system able to accept more than 50% of required power from renewable energy without system stabilization**
  - \* **Disaster-prevention and highly secure 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.

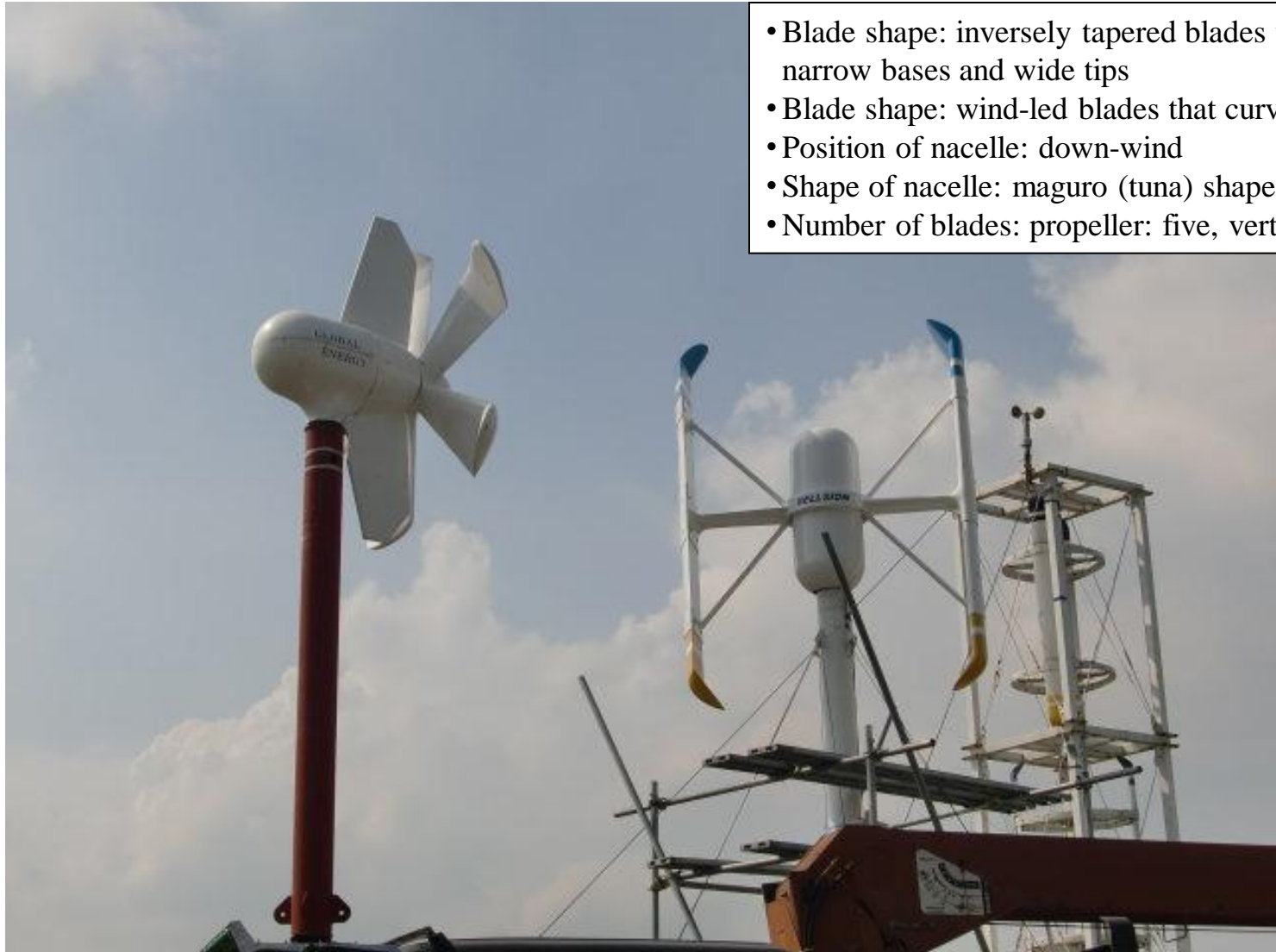
# Excess and Shortfall Interchange Systems Using Power Routers



## **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

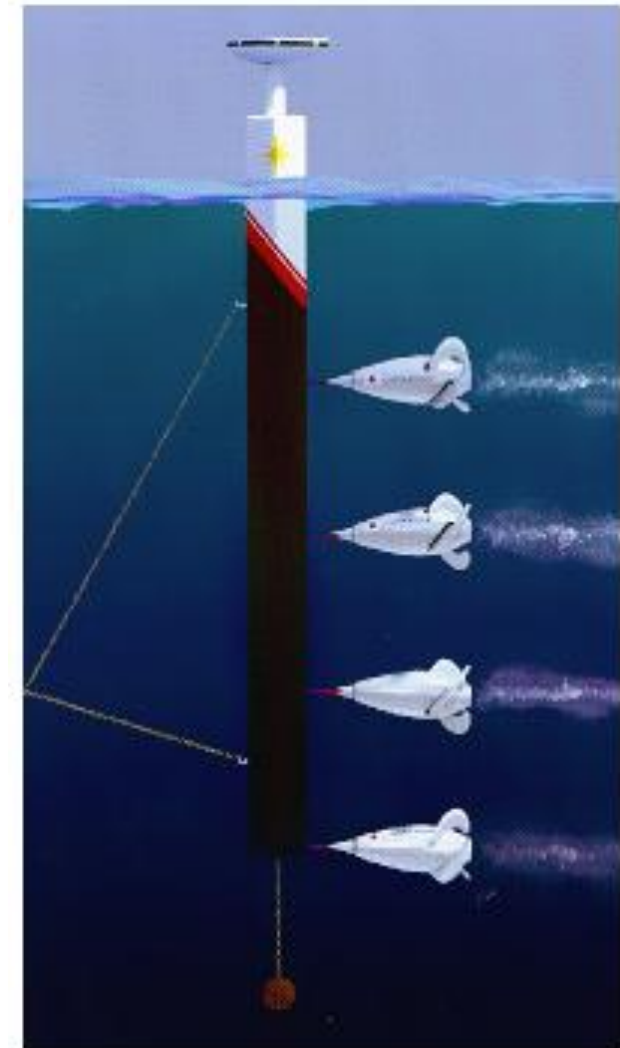
# (Reference 1) Tuna-Shaped Tidal and Ocean Current Power Generation Turbine

2000kW tidal power generation

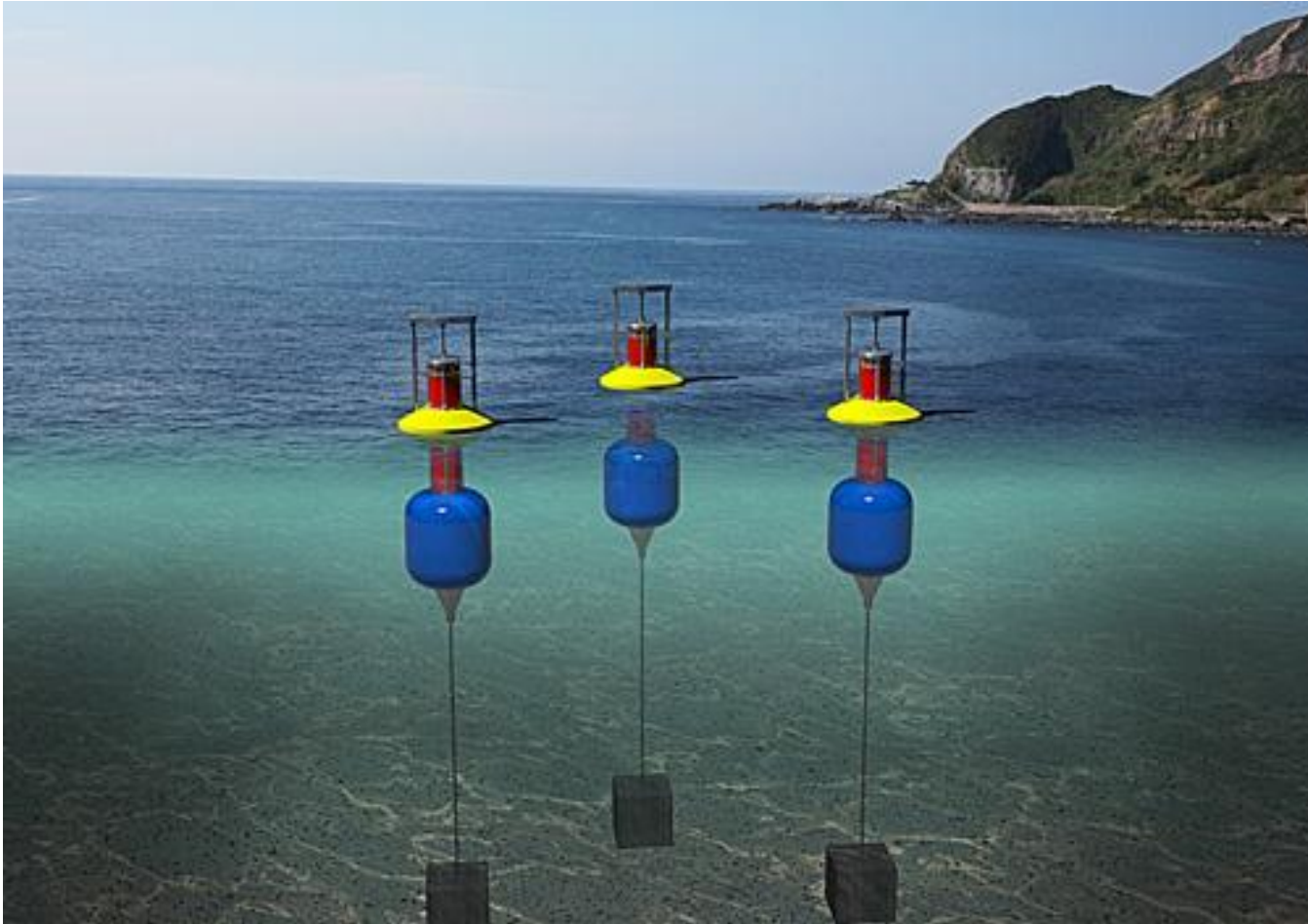
NT030 Maguro Turbine



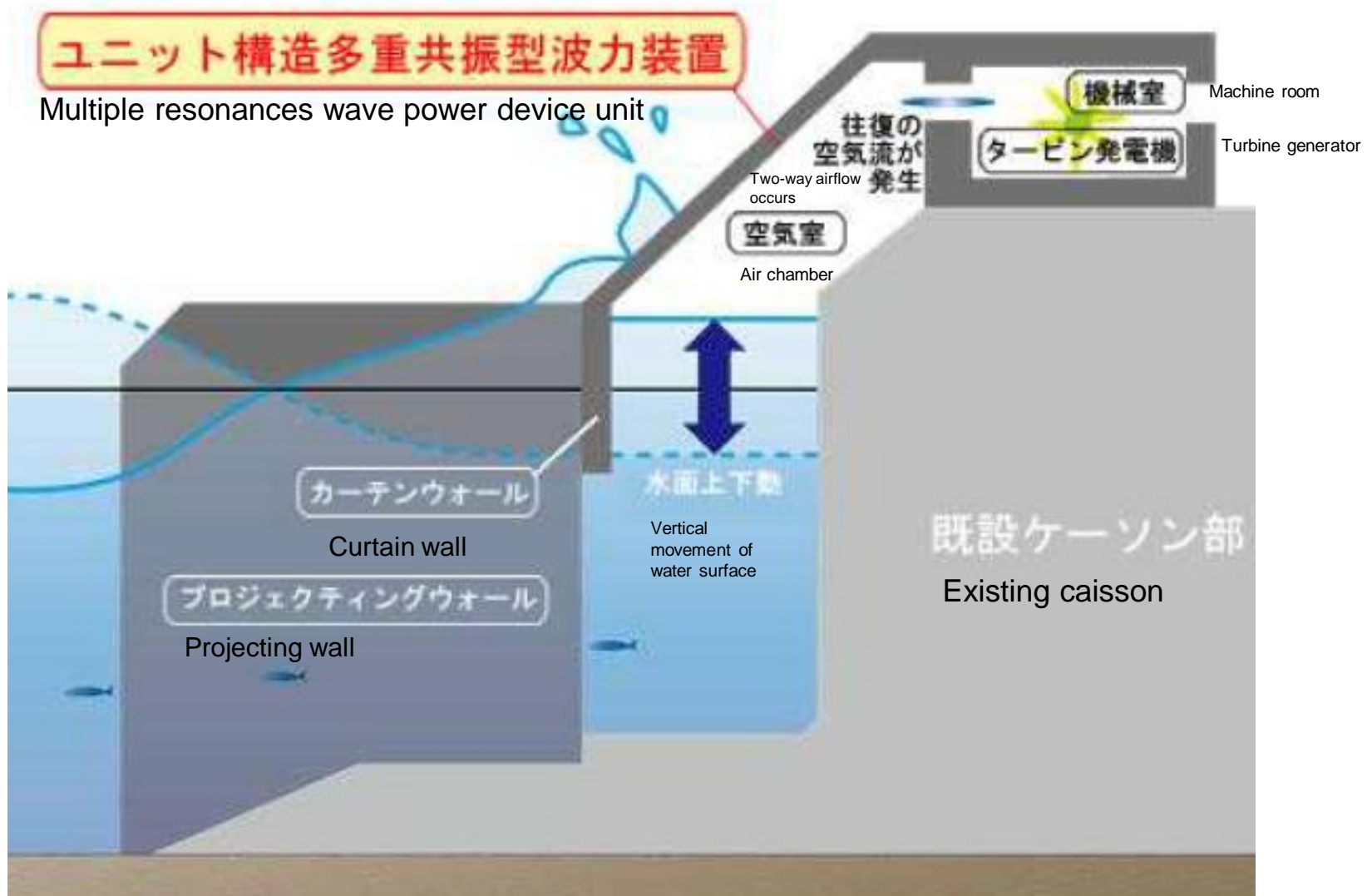
(Source) Nova Energy web site



# (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.