



Cutting-edge technologies of self reliant
and distributed energy

Kimio Yamaka,
President of the Institute of Energy Strategy

Three World-Class Energy Technologies in Japan

- Key Technologies of Smart Community -

1. Large Scale Batteries for Control of Renewable Energy
2. Clustered Local Network
3. Bellsion Wind Turbine

1. Large Scale Batteries for Control of Renewable Energy

- Control output to a certain range with the combination of wind power and batteries
- Have the same function as thermal power
- Enable planned power transmission
- Construction of smart grids based on this technology
- Quick construction of local network enabled by the utilization of high-capacity batteries

Rokkashomura-Futamata Power Station with Batteries



Rokkashomura-Futamata Power Station

Source: Japan Wind Development Co. Ltd.



1.5MW
Wind
Turbines

NAS Batteries

PCS Build.

Administrative
Building

154kV S/S

Smart Grid Demonstration in Rokkashomura

Rokkashomura-Futamata Wind Power Station

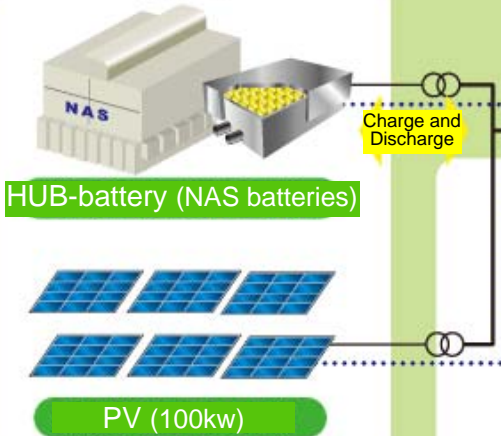
Simulated core grid



Smart Grid Pilot Facilities

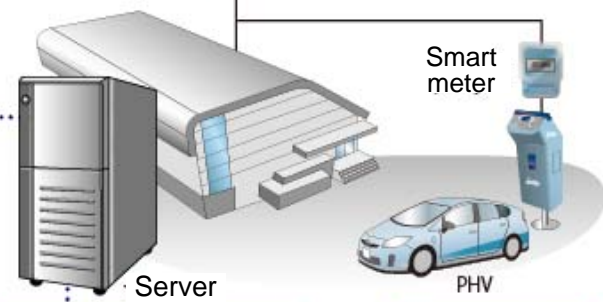
Simulated distribution grid

Supply side

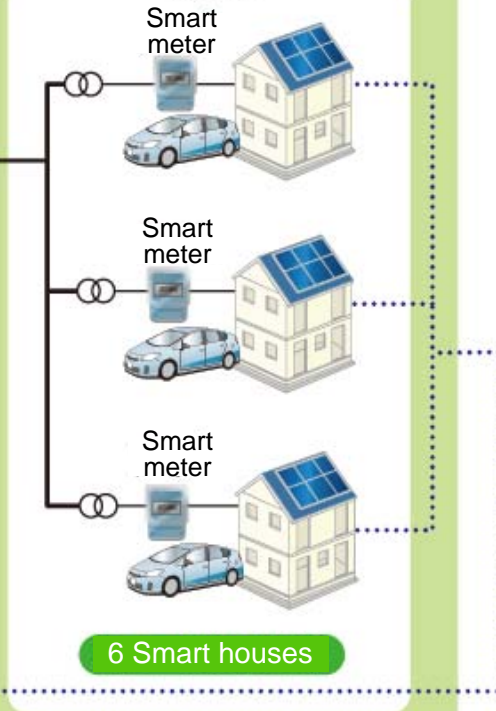


Private Distribution Line

Use ICT to adjust supply-demand targeting the demand side as well



Demand side



Role of Control Center

- Control information links between supply side and demand side service
- Manage supply-demand at the grid level

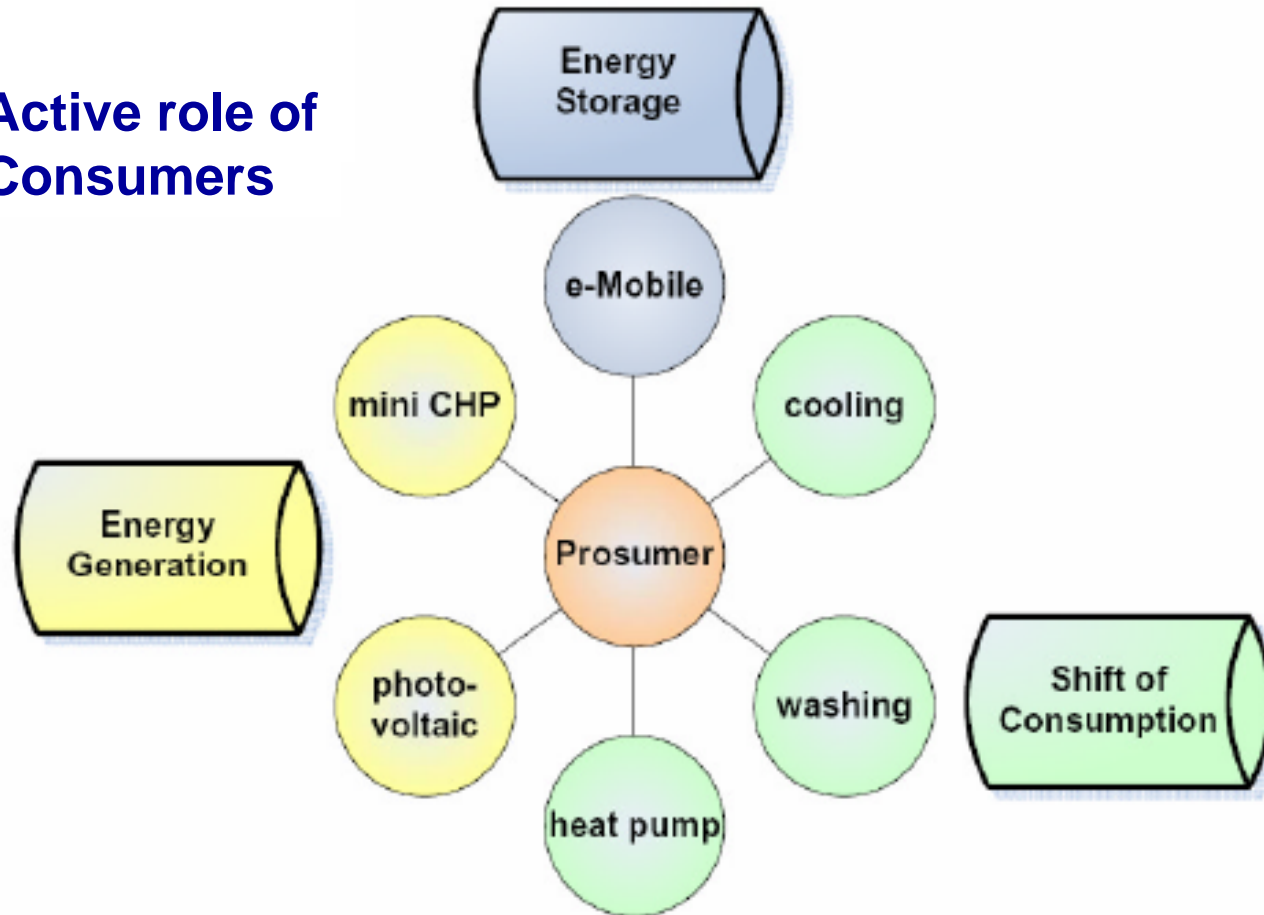


2. Clustered Local Network “The Smart Grids”

- New technology introduced by a new concept of accommodating the excesses and shortfalls of power between PROSUMERS (producers and consumers)
 - (1) Earth friendly system able to accept more than 50% of required power from renewable energy without system stabilization
 - (2) Disaster-preventive and highly secure system that is independent from blackouts
 - (3) Low initial cost, scalable and simple system that is easy to use in developing countries

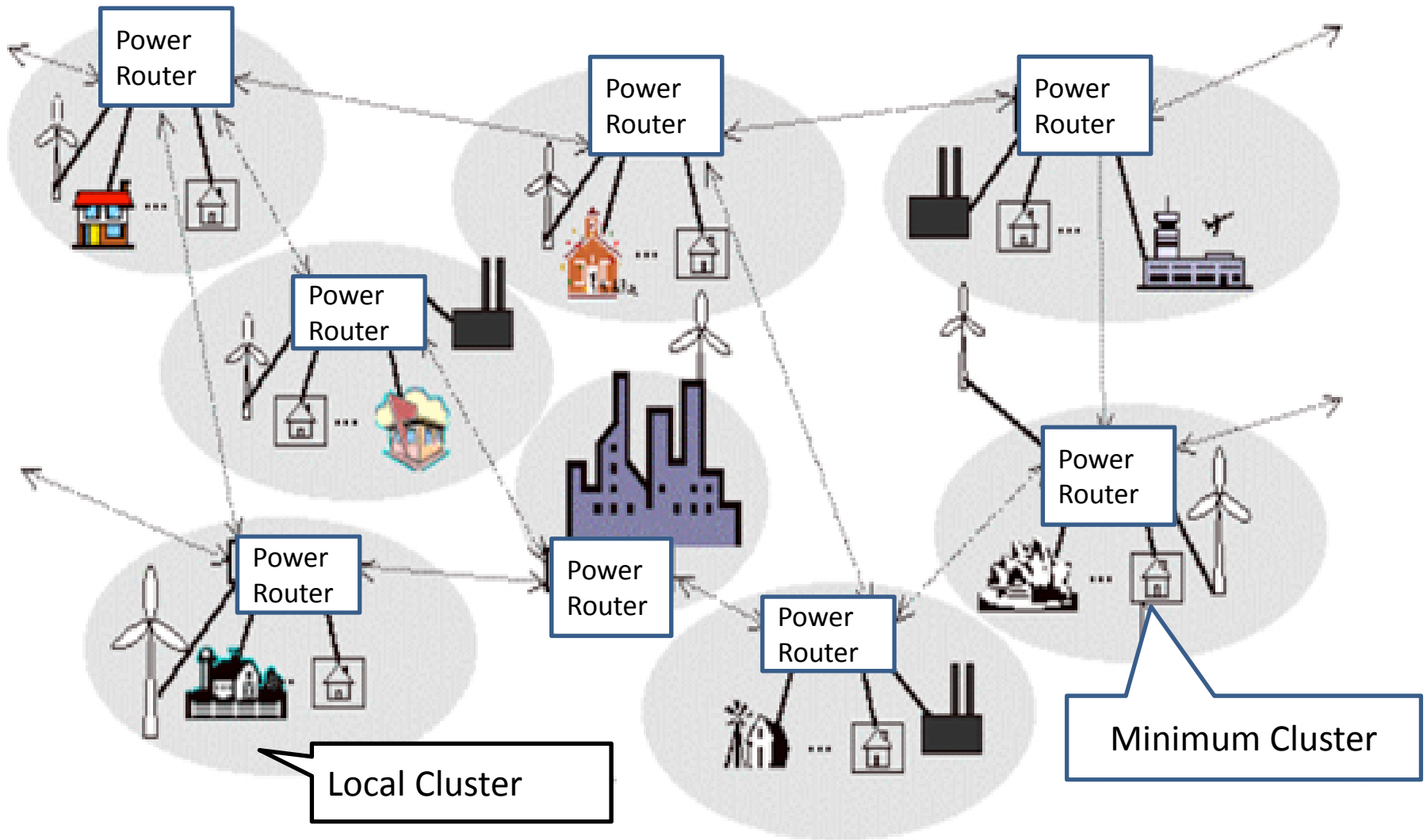
PROSUMER (keyword of Smart Grids in Europe)

Active role of Consumers



Source: Federal Ministry of Economics and Technology of Germany

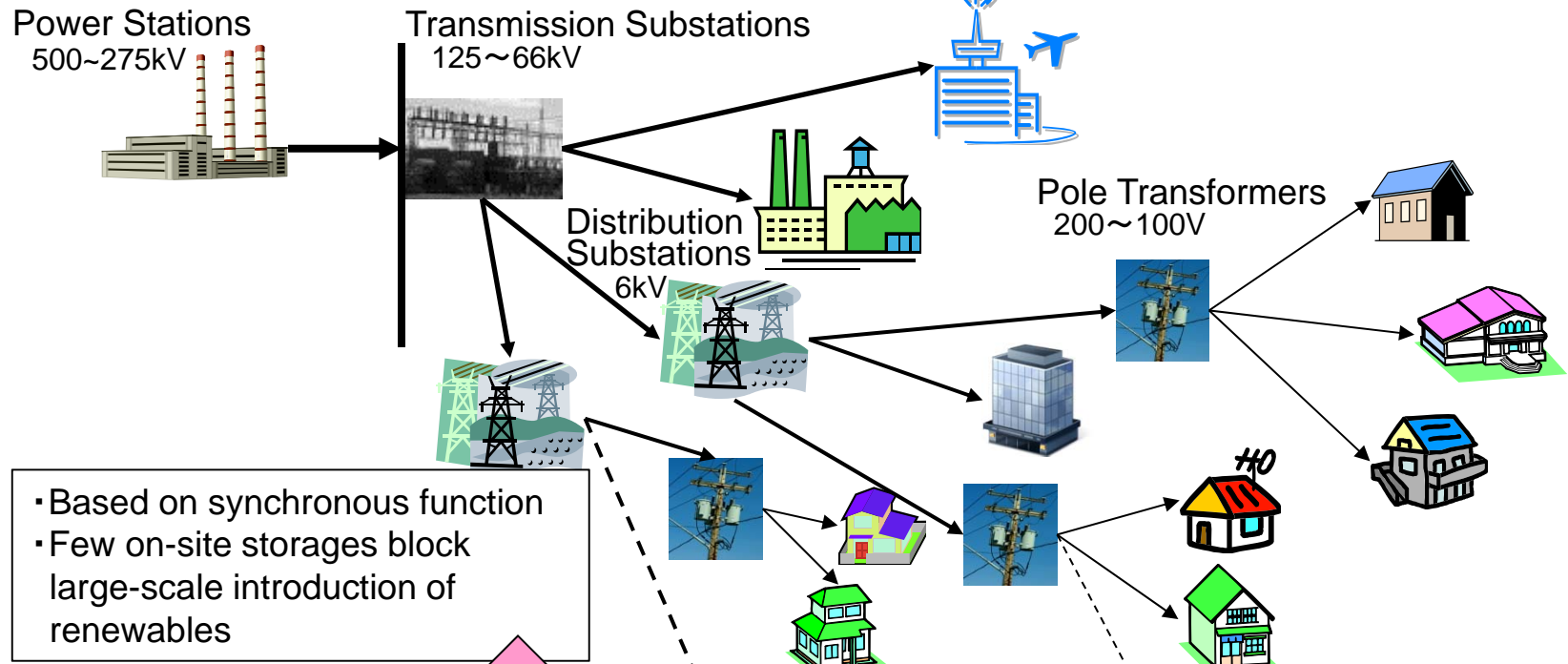
Concept of Electricity Cluster Oriented Network (VPEC)



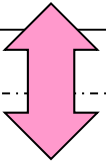
Source: VPEC Co. Ltd.

Electricity Cluster Oriented Network and Grid

Present System: GRID



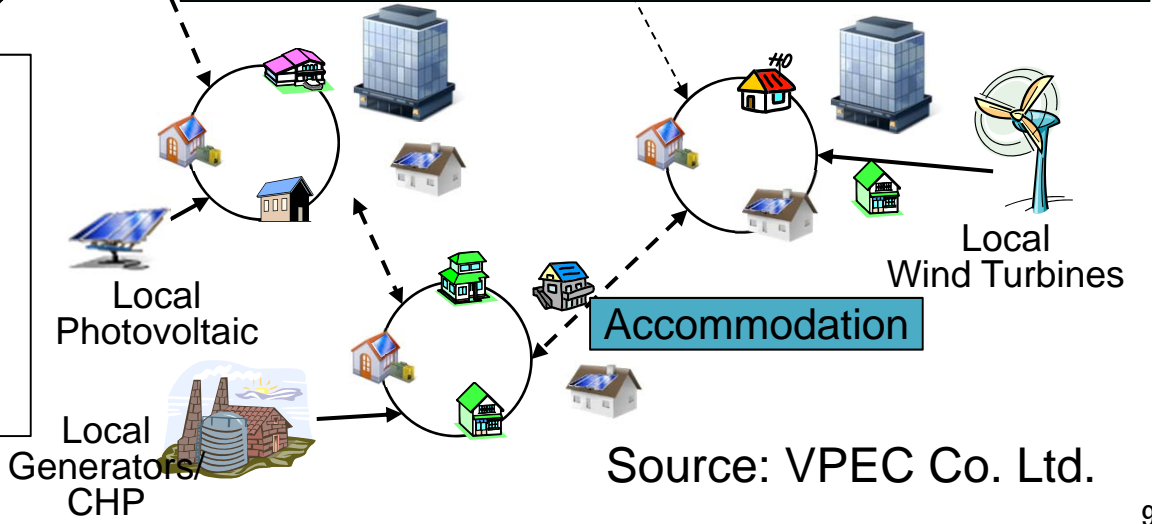
Mutual complement



ECONETWORK

- Local generation for local consumption = PROSUMER
- Excesses and shortfall accommodation between clusters
- Autonomous control in between clusters such as regions, communities, householders

Win-Win Solution for GRID and ECONETWORK



Source: VPEC Co. Ltd.

3. Bellsion Wind Turbine

- Developed by Global Energy, which has its research institute in Tochigi
- Hydrodynamics Innovation:
 - Overcomes scientific common sense by adopting its design which uses frictions as energy
- Wind turbine Innovation:
 - ✓ Low-speed start-up, strong inertia, high utilization rate
 - ✓ Low noise
 - ✓ Pass-through surface, no friction between turbines
- Applicable to waterwheels, propellers, tide powers, screws
- High efficiency even in small or mid-size, suitable as local generators

Bellsion Wind Turbine

- Blades of inversely tapered type
- Nacelle of down-wind type

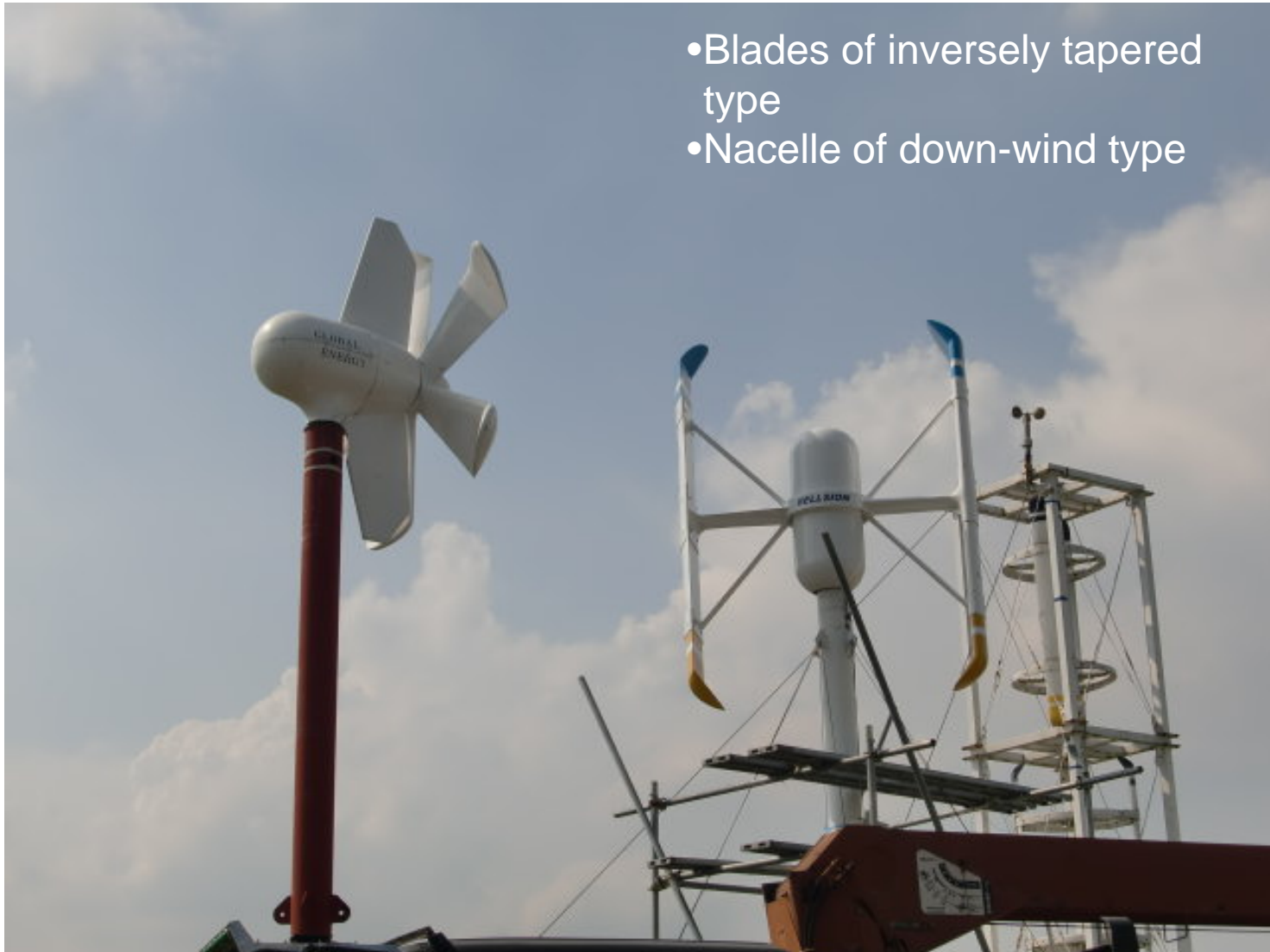


Photo by the Author on July 2011 at Tochigi Research Institute of Global Energy

Demonstration Project in Hachijo Island



Source: Tokyo-MX-TV

Thank you for your listening