

System Integration of Renewables

- Japan's Challenges & Prescriptions -

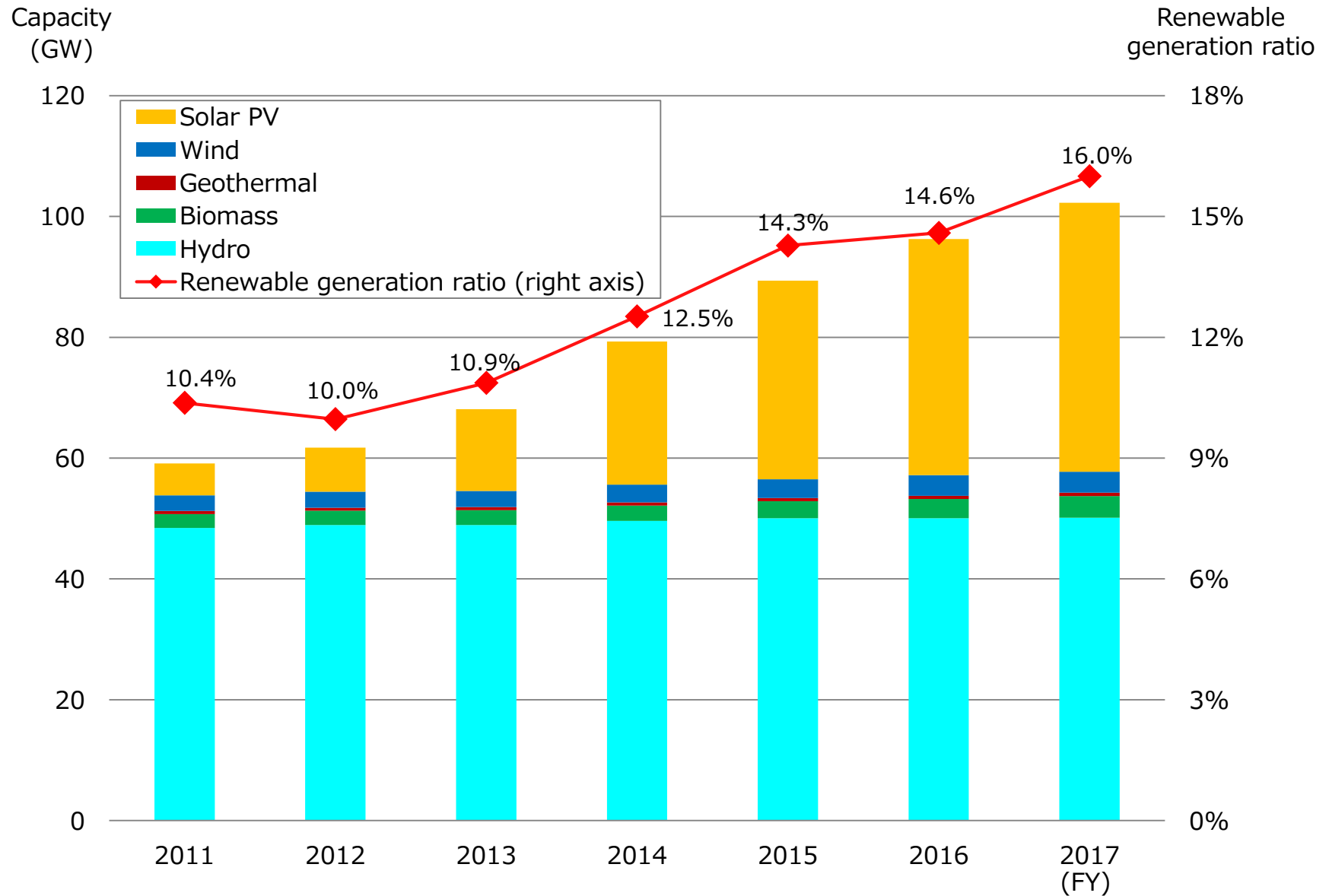
MATSUMOTO Yohei

State Minister of Economy, Trade and Industry

1st October 2019, Berlin, Germany

Global Ministerial Conference on System Integration of Renewables

Renewable Electricity Introduction in Japan



Major Challenges toward Further Renewables Expansion

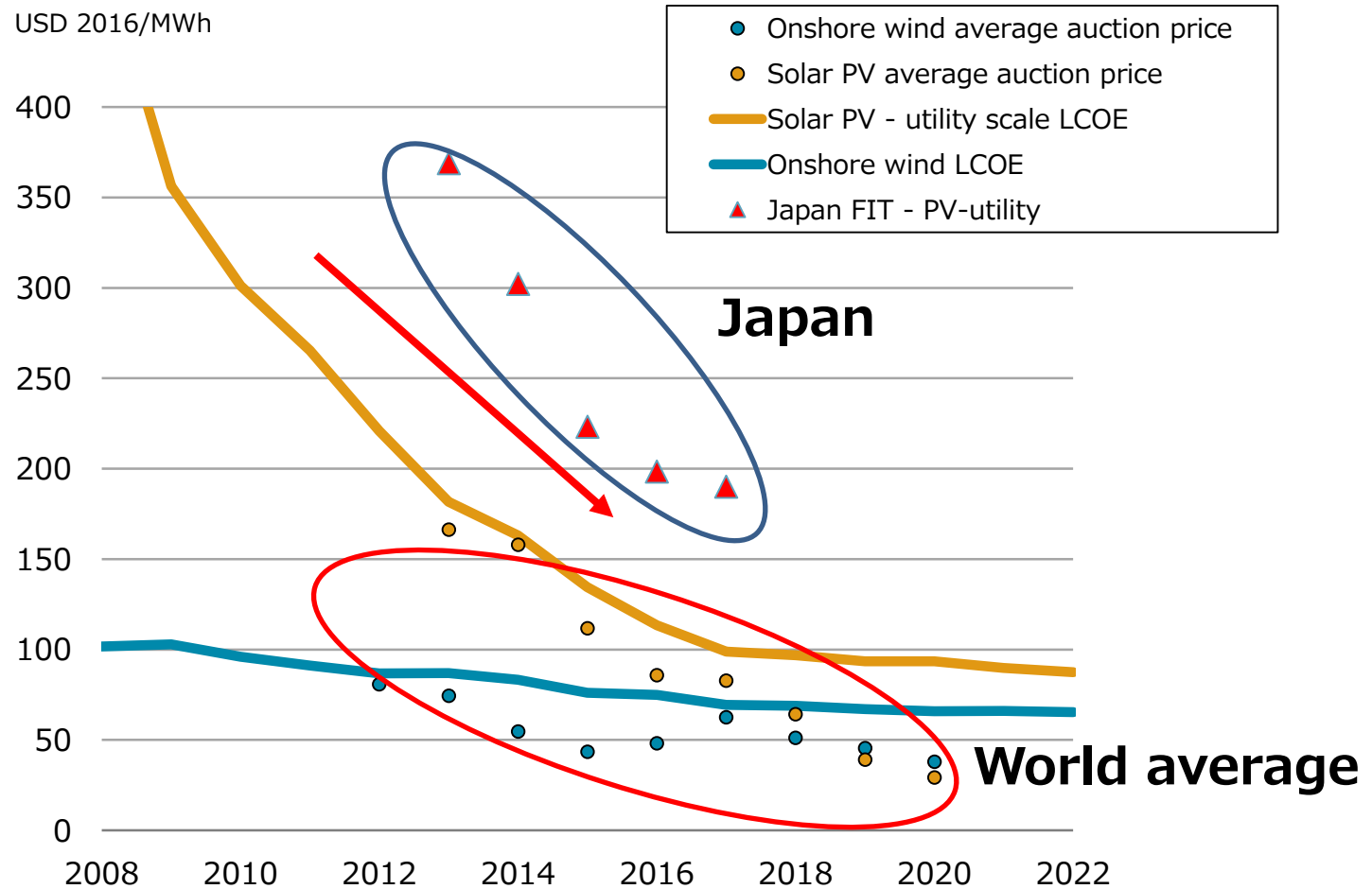
**Higher
Cost**

**Grid
Constraints**

**More
Flexibility**

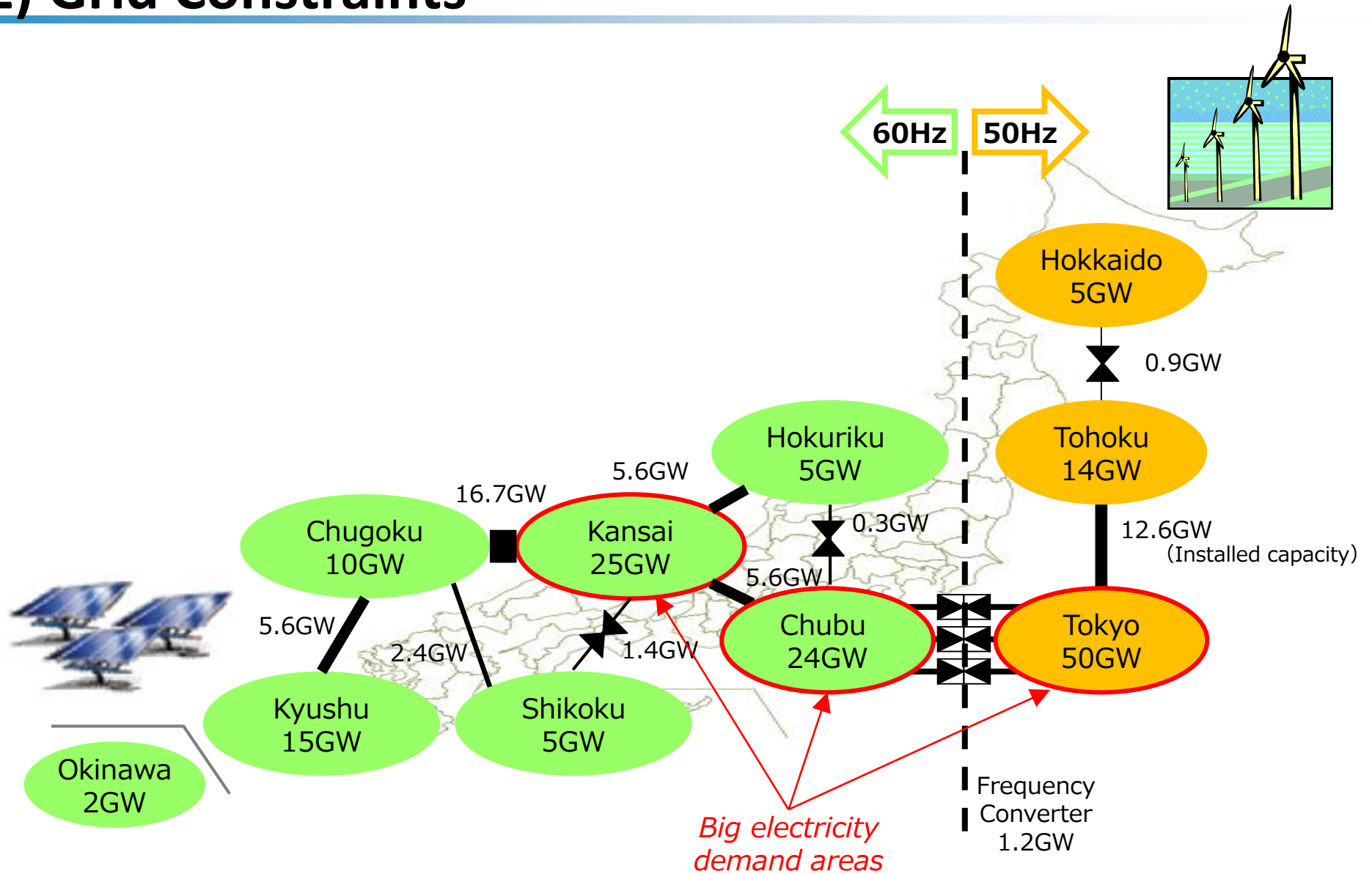
1) Higher Generation Cost and Increasing FIT Surcharges

Global renewable LCOE trend



Source: IEA Renewables 2017

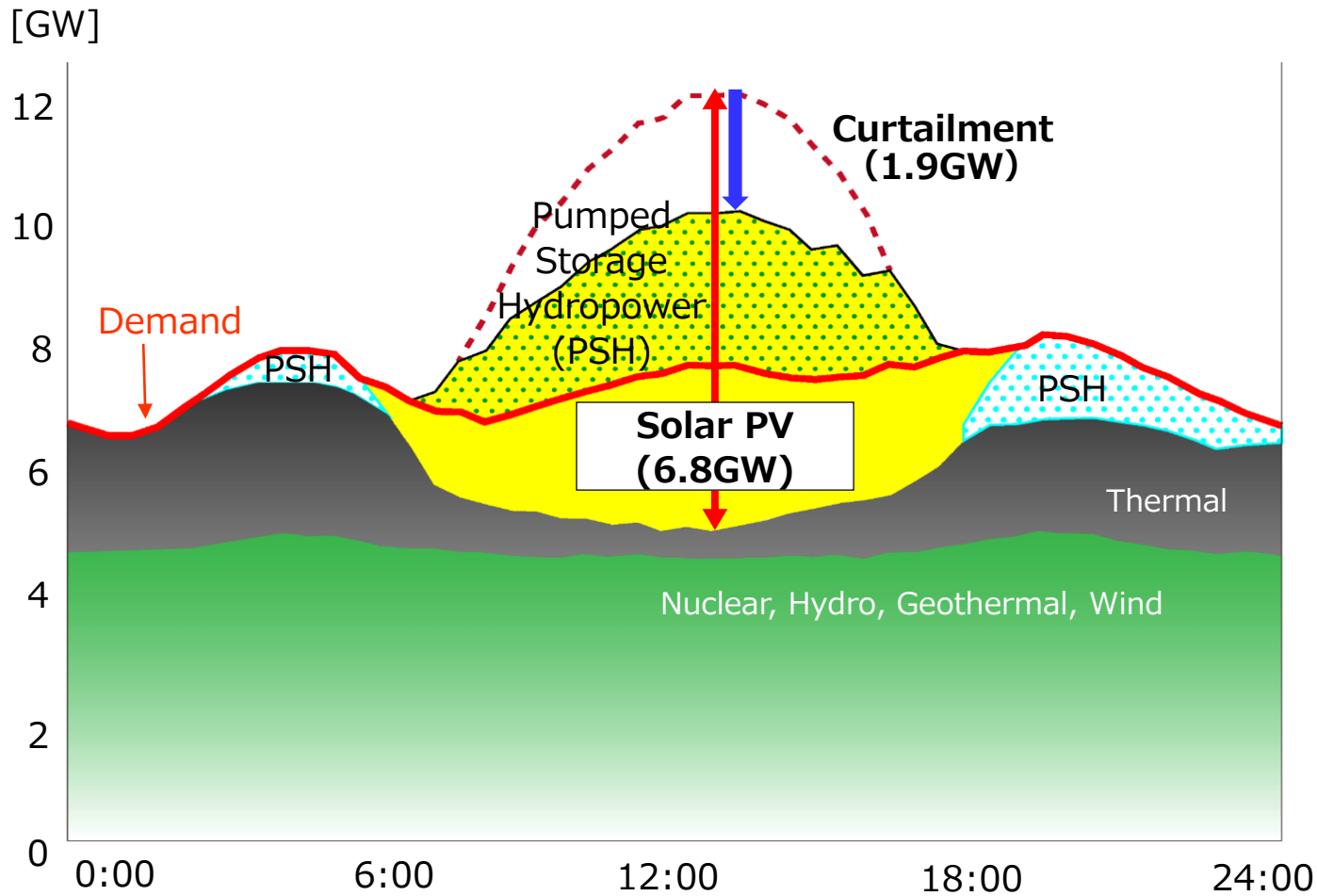
2) Grid Constraints



Note: The figure in each area above indicates the maximum electricity demand in 2016.

3) Growing Flexibility Needs

Supply and demand balance in Kyushu
(3rd May 2019)



Source: Kyushu Electric Power Co.,INC

Future Direction toward Renewables as a Main Power Source (1)

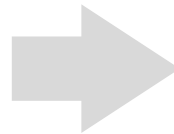
Higher cost

- Expanding auction scheme for Solar PV, Wind and Biomass generation
- Constructing better business environment for Offshore Wind
- Reforming FIT scheme suitable for the characteristic of each power source

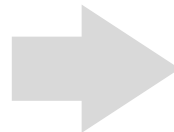
Promoting Offshore Wind

Challenges

Ocean use right



Consultation with
fishermen



Cost



Measures by new Act

- ✓ Designate promotional zone
- ✓ Select developers by auction
- ✓ Grant 30 year ocean use rights

- ✓ Establish a consultation body led by the Government

- ✓ Introduce cost-competitive mechanism

Future Direction Toward Renewables as a Main Power Source (2)

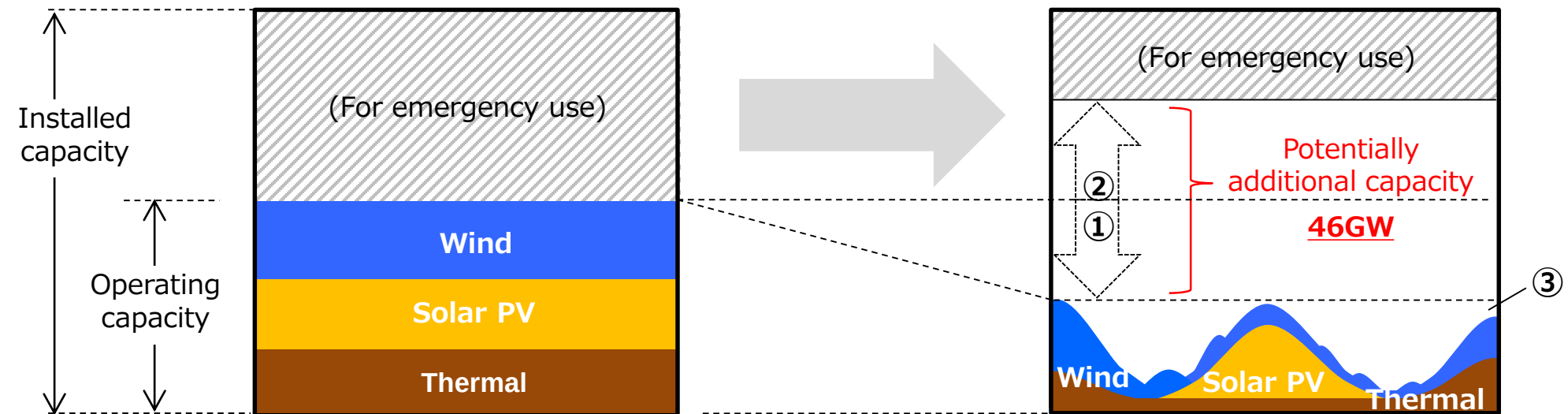
Grid constraints

- Grid reinforcement based on cost-benefit considerations
- Maximum use of existing grid (“Connect and Manage”)

Maximum Use of Grid: Japanese “Connect & Manage”

Previous grid operation

New grid operation



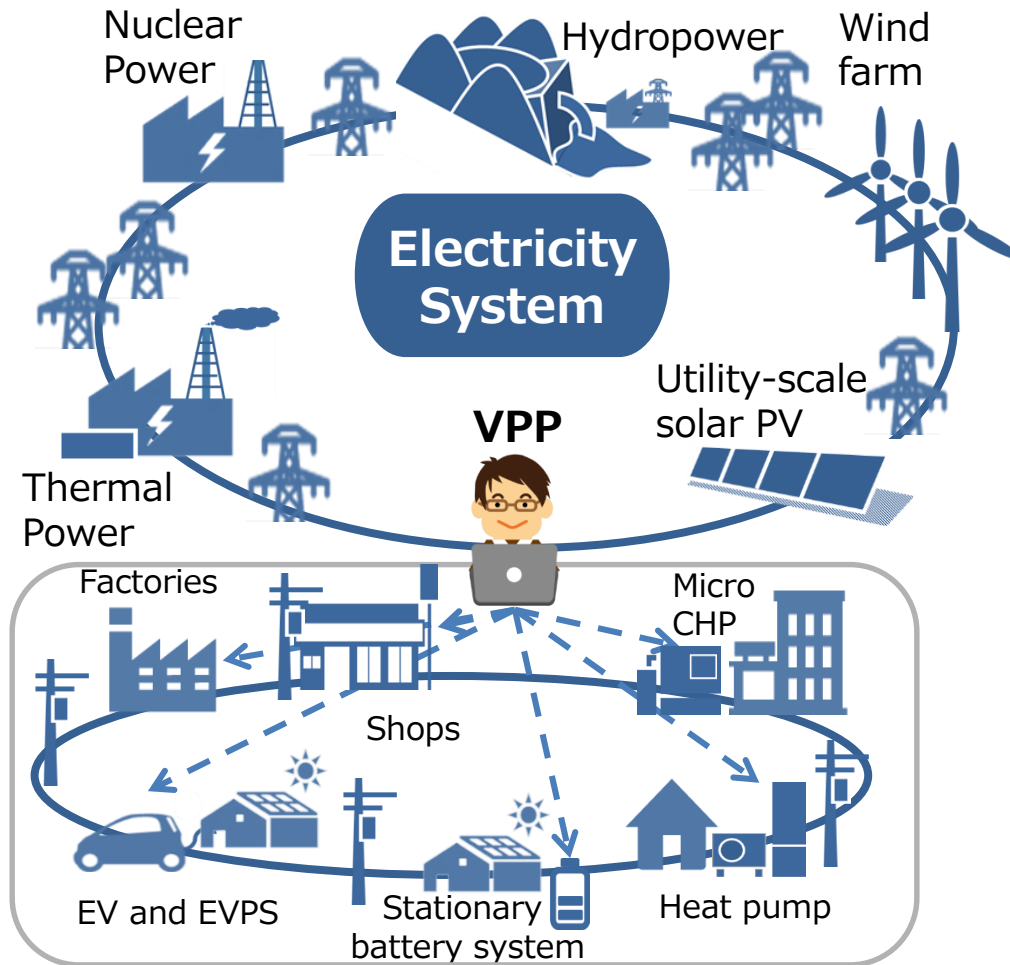
- ① Probabilistic evaluation of each generator
- ② Release the capacity by inter-tripping in emergency condition
- ③ Grid access without grid enhancement with the conditions of curtailment

Future Direction toward Renewables as a Main Power Source (3)

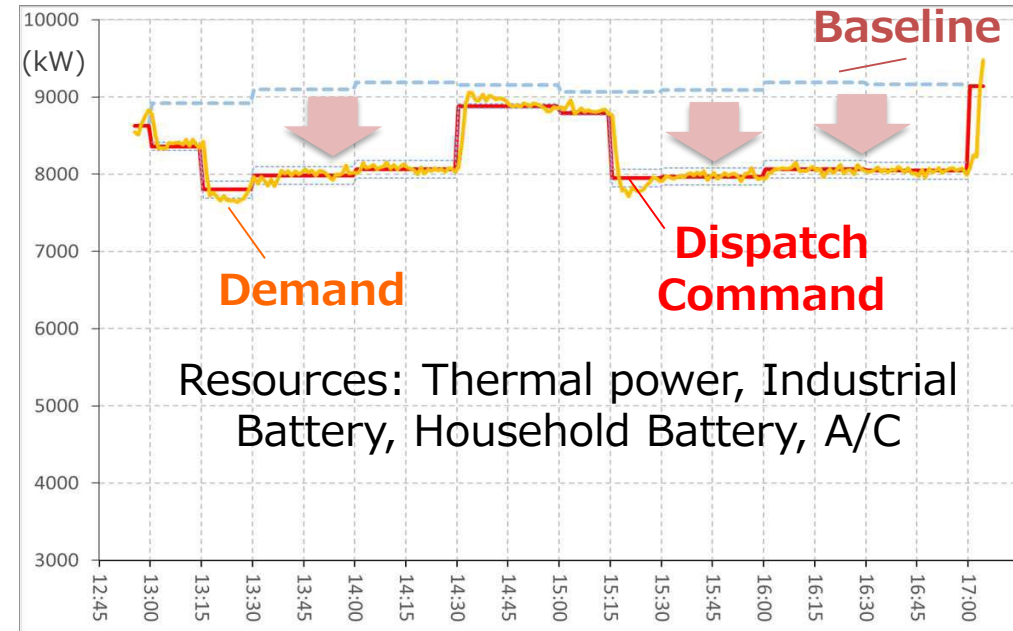
Flexibility needs

- Enhancing conventional flexibility sources
(Interconnection, Thermal Power, Pumped Storage...)
- Exploring new flexibility sources
(Virtual Power Plant, Demand Response, Electric Vehicle...)

Advanced Flexibility System: Virtual Power Plant (VPP)

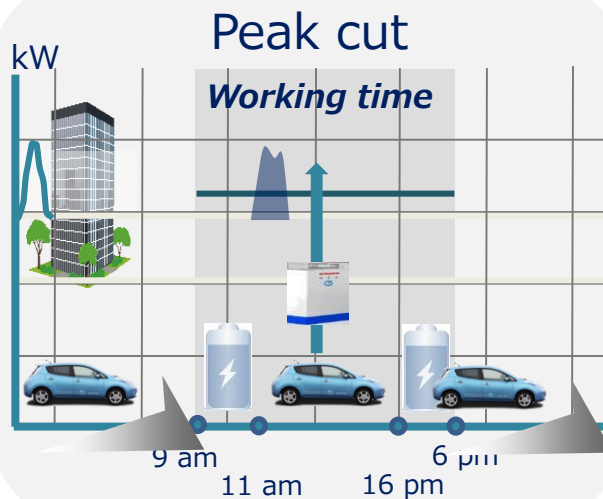
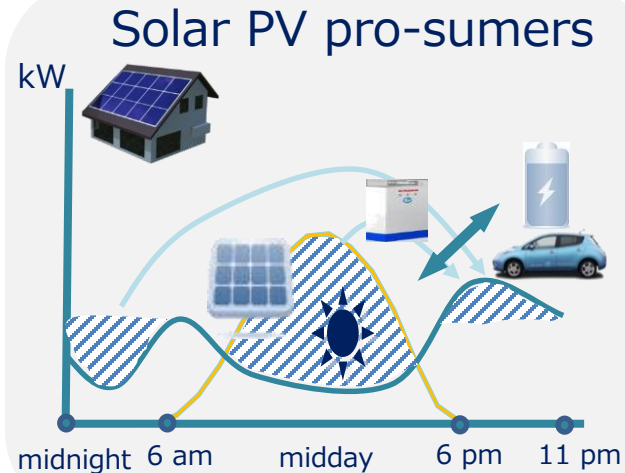


Power controlled by aggregators



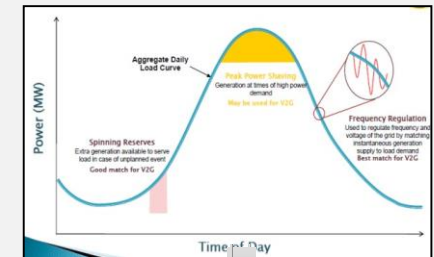
Resilience

back-up power at **grid power outage**



Grid Stabilization

Charge/discharge to/from the grid



Source: PJM

V2H



Home

3 ~ 8 kW

V2B



Building

10 ~ 100

Smart Charging, V2G



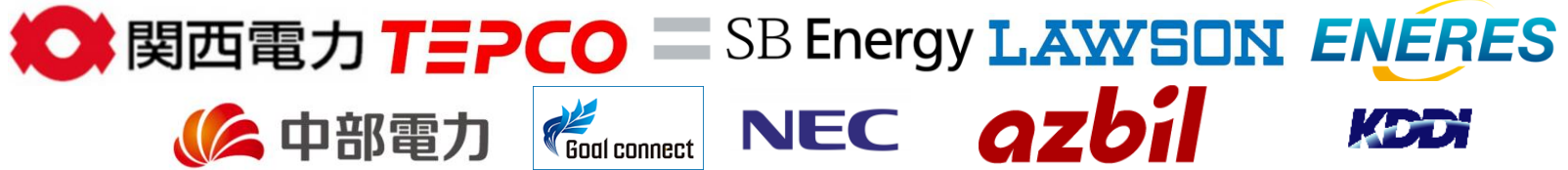
Grid

100kW ~

Source: Nissan

Major Aggregators in Trial VPPs Project

Aggregation Coordinators



Resource Aggregators



Conclusion

Higher cost

- Expanding auction scheme for Solar PV, Wind and Biomass generation
- Constructing better business environment for Offshore Wind
- Reforming FIT scheme suitable for the characteristic of each power source

Grid constraints

- Grid reinforcement based on cost-benefit considerations
- Maximum use of existing grid

More flexibility

- Enhancing conventional flexibility sources
- Exploring new flexibility sources