July 7, 2021

United Nations Economic and Social Commission for Asia and the Pacific – Greater Tumen Initiative

Seminar on Energy Cooperation in North-East Asia: Regional Power Trade and Connectivity in North-East Asia

Renewable Energy Integration: Minimizing Curtailment

Renewable Energy Institute

Romain Zissler, senior researcher

About Renewable Energy Institute



自然エネルギー財団

- Think tank established in the aftermath of Fukushima Daiichi nuclear accident by Masayoshi Son, Chairman & CEO of SoftBank Group.
- Promotes renewable energy and energy efficiency as main solutions against climate change.
- Contributes to the energy debate through research publications and organization of events.
- Facilitates the exchange of knowledge by building a network of stakeholders.

Presentation plan

1. **Renewable energy (RE) curtailment: Definition & (good) reasons to minimize it**

2. **Case study: RE curtailment in Japan**

3. **Examples of solutions to minimize RE curtailment**

1. RE curtailment: Definition & (good) reasons to minimize it

RE curtailment definition

"Curtailment is the reduction of output of a renewable resource below what it could have otherwise produced.

It is calculated by subtracting the energy that was actually produced from the amount of electricity forecasted to be generated."

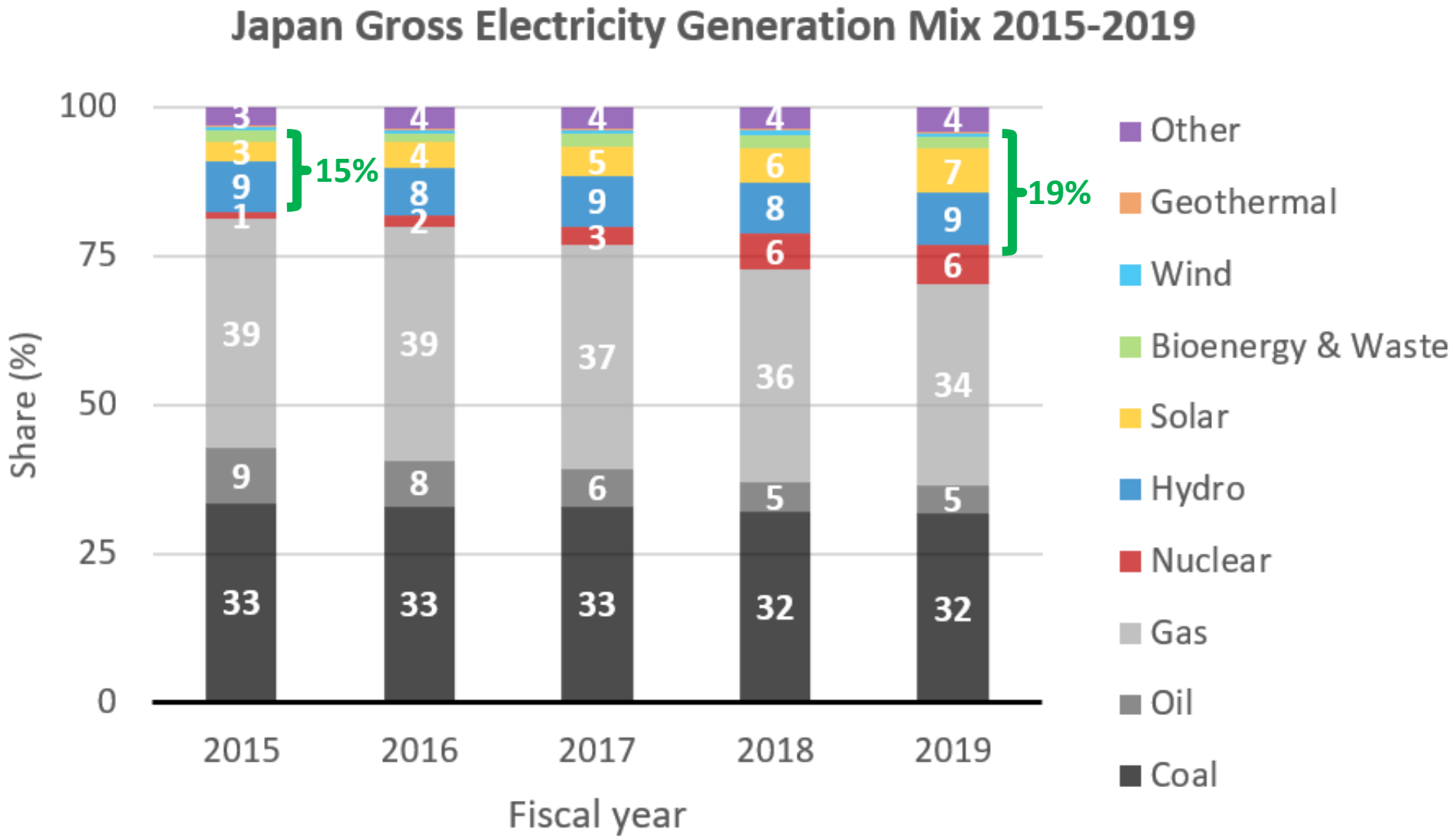
– California Independent System Operator –

(good) reasons to minimize it

It is an economic and environmental waste.

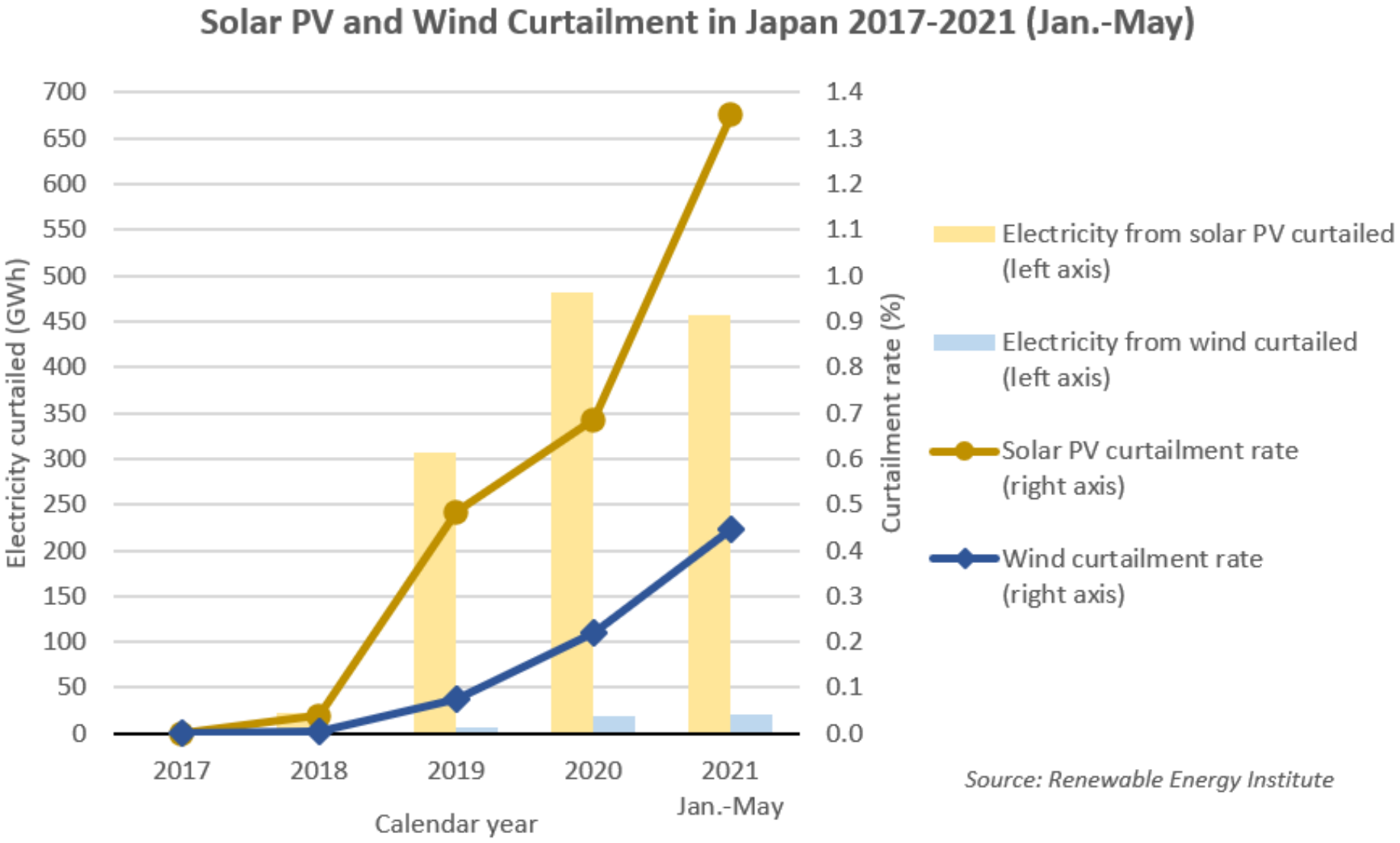
2. Case study: RE curtailment in Japan

Domestic RE expansion



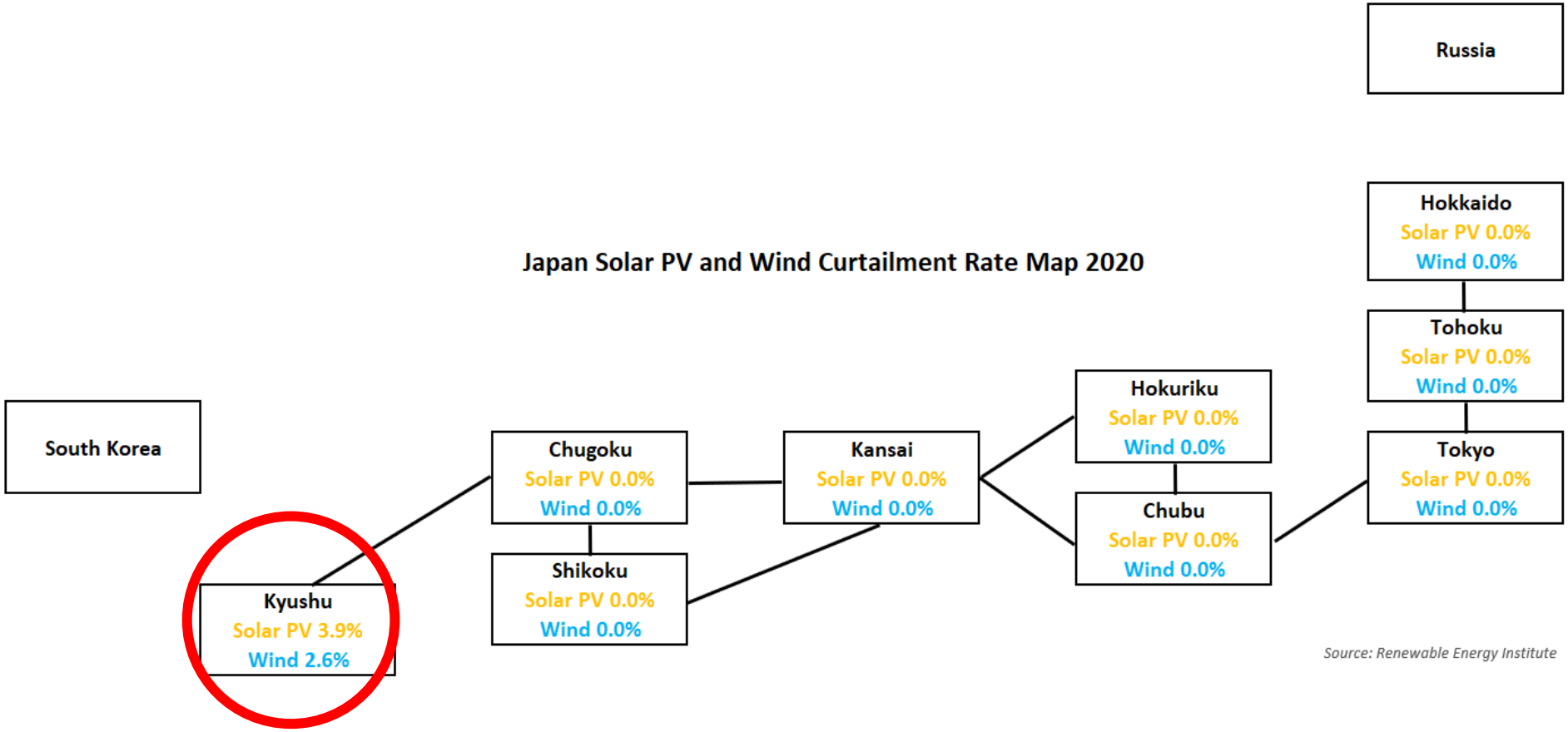
Source: International Energy Agency

Nationwide RE curtailment is limited…

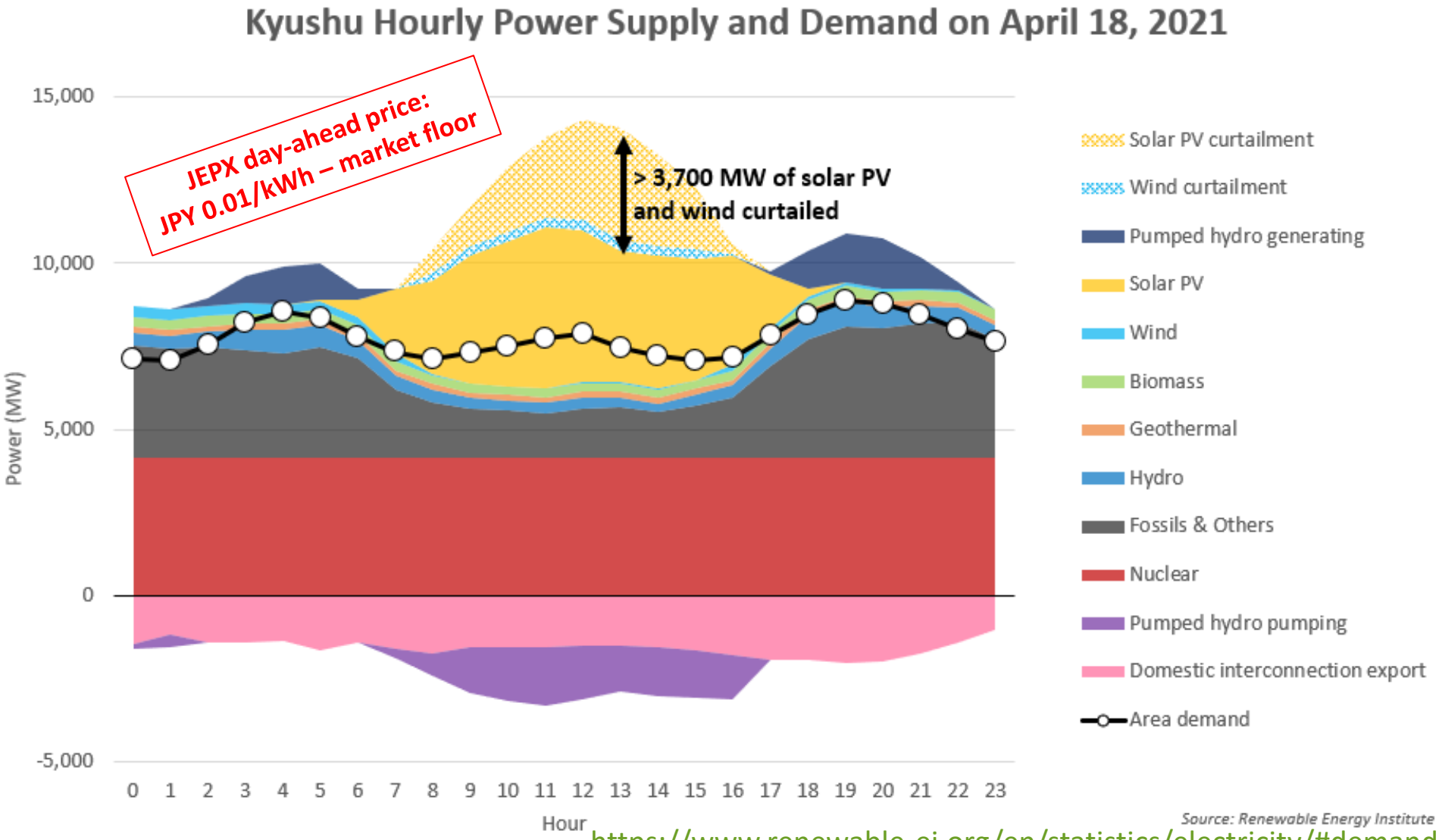


Source: Renewable Energy Institute

… But the situation is not the same everywhere



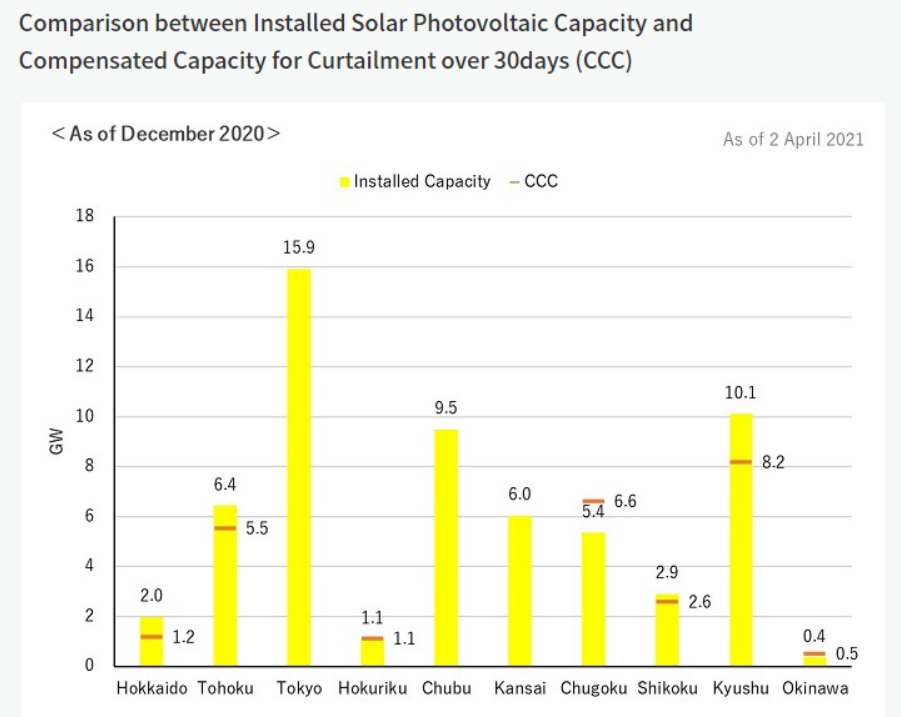
Focus on Kyushu area



Source: Renewable Energy Institute

https://www.renewable-ei.org/en/statistics/electricity/#demand

Japan – Key points



tailment Rule of Power Plants

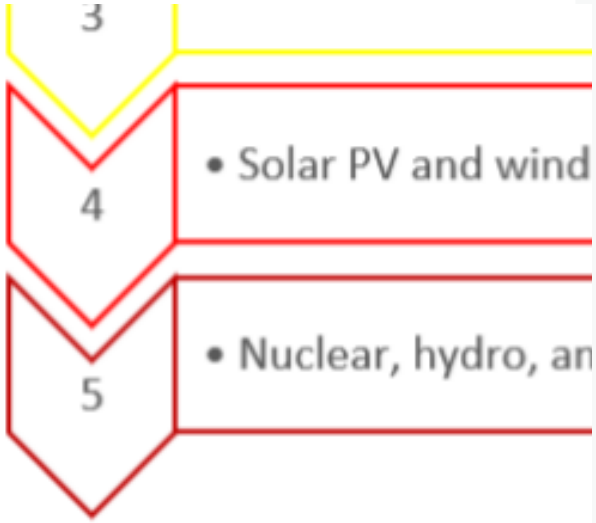
nd gas, adjustments
ydro adjustment

al interconnections

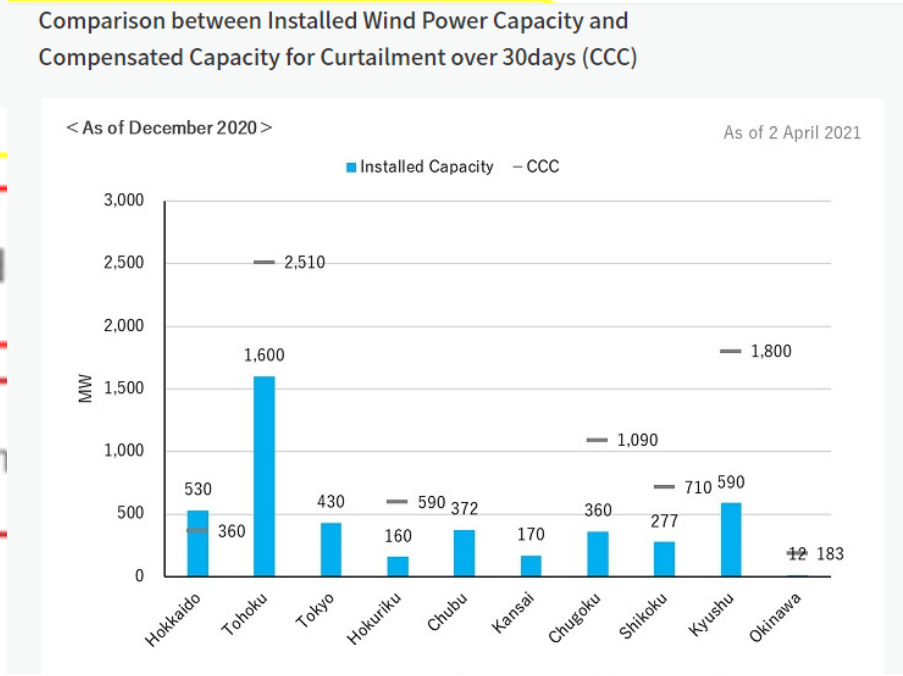
tch,

ernational

hort-term



- **Majo**
- If the
be cu
- If the
outpu



3. Examples of solutions to minimize RE curtailment

Solutions

- **There are multiple solutions (under multiple dimensions) to minimize RE curtailment:**

- Economic dispatch (regulatory),
- Allowing price volatility – enabling meaningful price signals (regulatory),
- Flexibility both on the supply and demand sides (techno-economic),
- Electrical grid reinforcement and expansion (techno-economic and regulatory),
- Energy storage (techno-economic and regulatory), and
- RE mix diversification (policy).

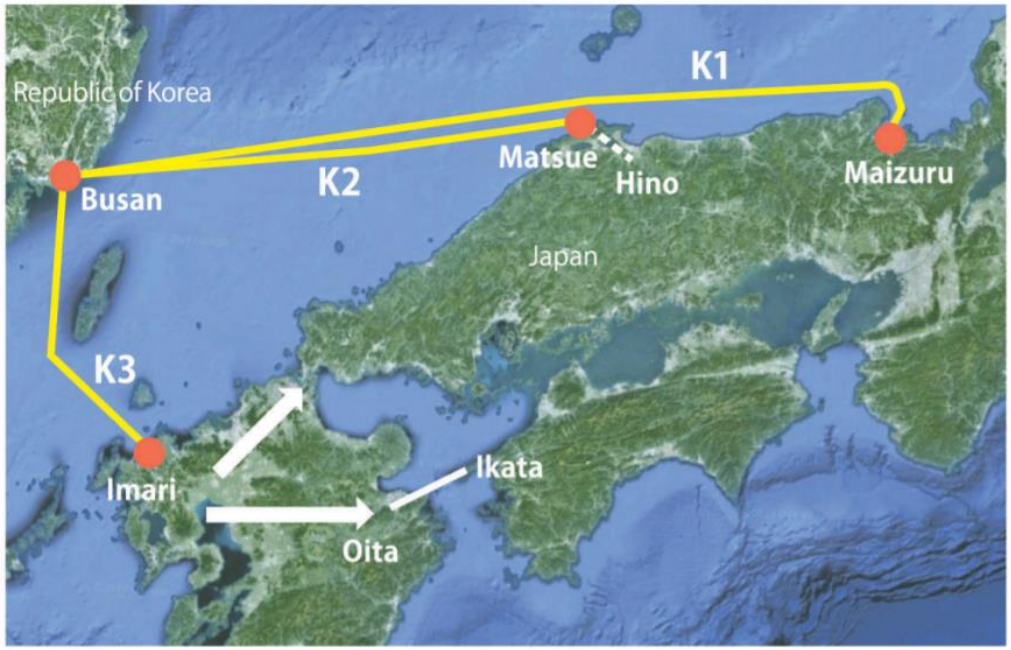
- **The real challenges are to:**

- Identify which basket of solutions is optimal depending on local conditions, and
- Design the right regulatory and policy frameworks.

Focus on international interconnections

- **Opportunities exist:**

- Examples of interconnection routes for Japan–South Korea;



K1 Busan—Maizuru
Length: 627km

K2 Busan—Matsue (→Kansai)
Length: 372km
+41 km grid reinforcement
(Matsue-Hino)

K3 Busan—Imari (→Kansai)
(via Chugoku & Shikoku region)
Length: 226km
+70 km grid extension (Oita-Ikata)

- **Main challenges:**

- Energy security concerns (related to possible geopolitical tensions), and
- Power companies' historical business structure and reluctance to competition.

Paradigm Shift in Energy



自然エネルギー財団

RENEWABLE ENERGY INSTITUTE