

Paris Session 2022



Contribution to the reduction of global
environmental impact through the
Introduction of environmentally friendly
distribution substation

SC B3 – PS 2
NGN Showcase

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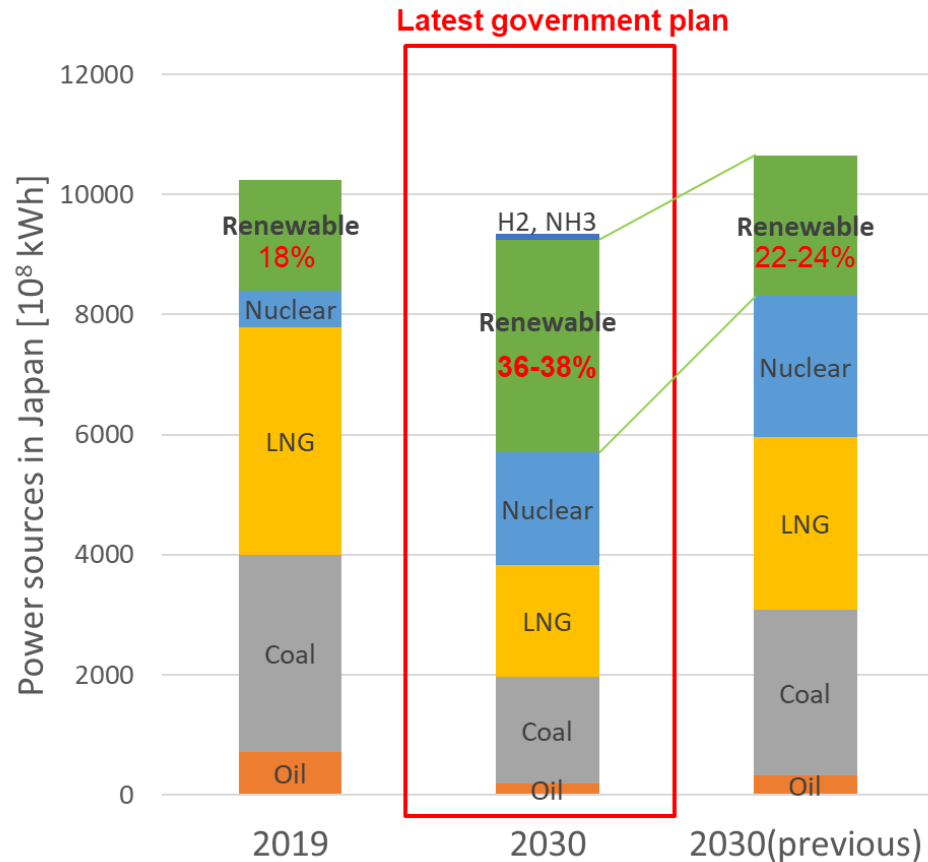


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1. Background – Renewable energy expanding

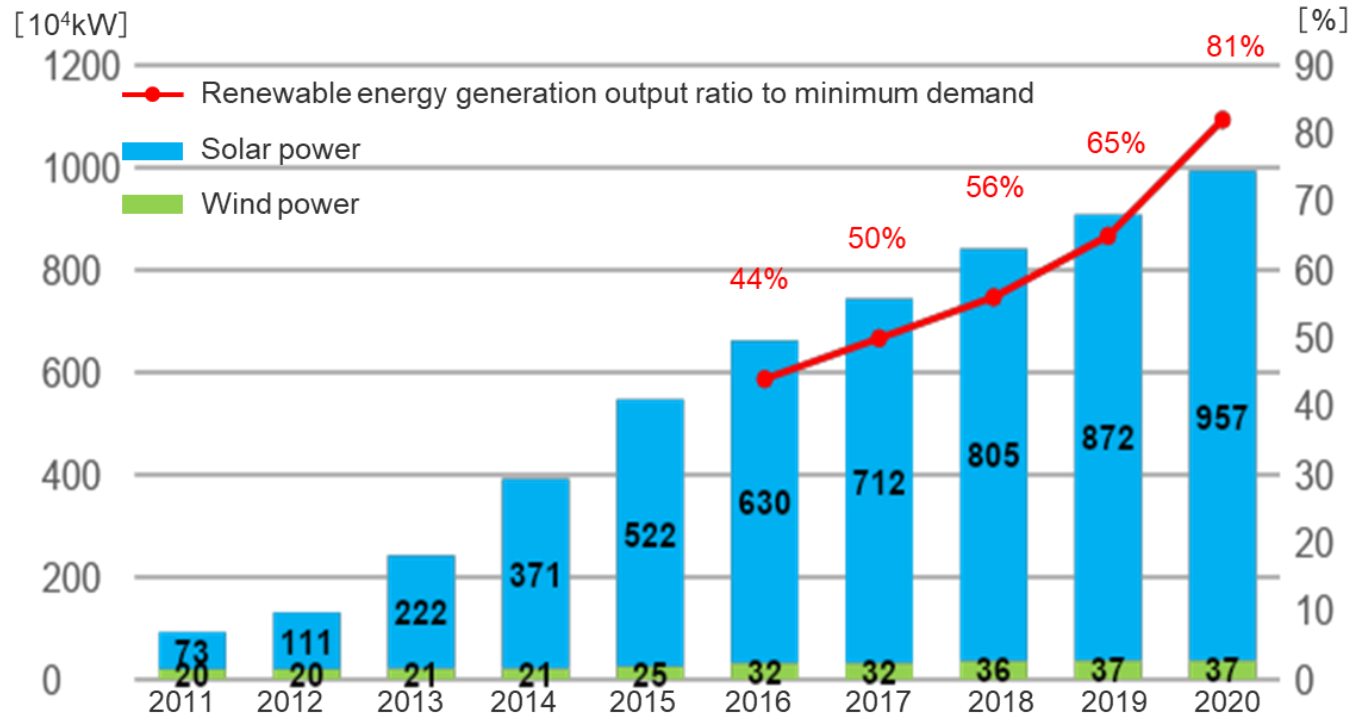


Agency for Natural Resources and Energy, The sixth Strategic Energy Plan in 2021

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- ✓ Global warming is considered to be one of the causes of abnormal weather, and there is a strong need to reduce greenhouse gas emissions.
- ✓ Japanese government has raised the target for the installation of renewable energy as a percentage of power sources from **22-24%** to **36-38%** in FY2030.
- ✓ Accommodate the demand of GHG emissions
 - Increasing renewable energy installations
 - Construction of environmentally friendly substation

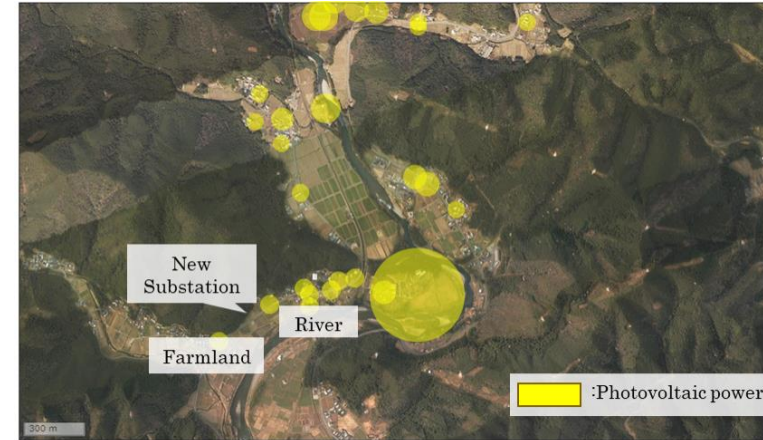
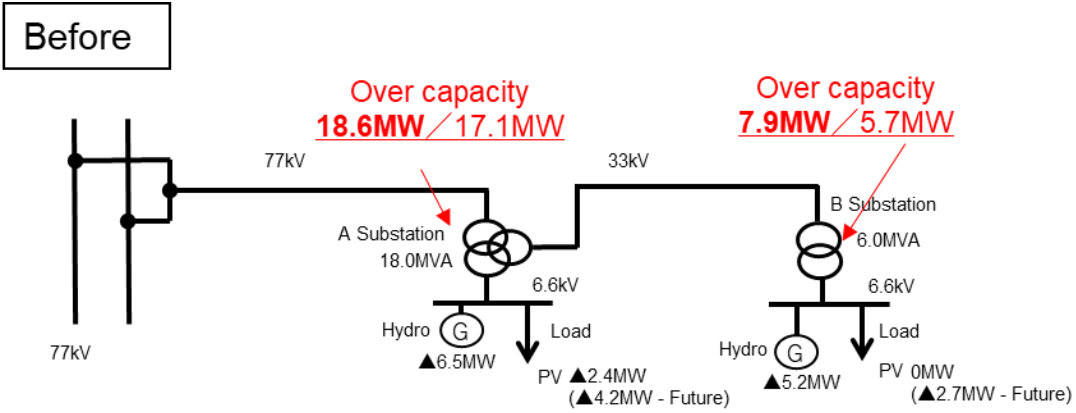
2. Rapid mass introduction of PV in Chubu area



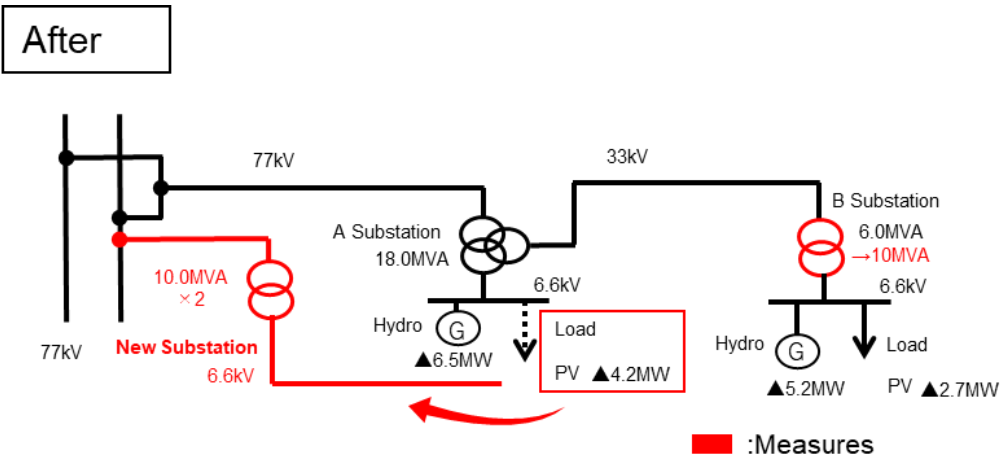
- ✓ Renewable energy resources tend to increase annually due to Feed in Tariff (FIT).
- ✓ The amount of increase in PV is dominant.

Changes in the amount of renewable energy generation introduced in Chubu Electric Power Grid

3. Increasing PV installations and New substation construction



URL:<http://maps.gsi.go.jp/>



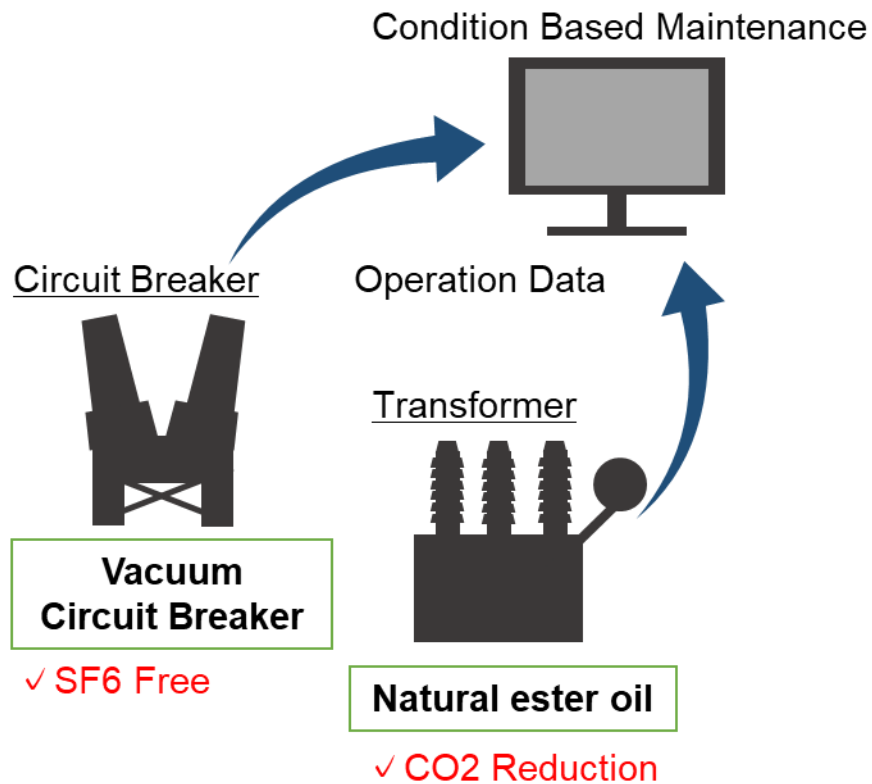
- ✓ We have found that the existing 77/6.6 kV and 33/6.6 kV transformers at our substations are expected to be over-capacity due to the increasing number of low-voltage PV installations and connection applications in some areas.

→ **New substation is needed.**

- ✓ The transformers in the new substation will be two 10 MVA units in consideration of the future increase in PV installations.

4. Environmentally friendly substation

4. 1. Reduction of GHG emissions



✓ The Policy of new substation

- Environmentally friendly
- Reduce GHG emissions

SF₆ gasless circuit breaker

Natural ester oil transformer

✓ Reduce the inspections

We will switch to a maintenance method that uses IoT sensors to conduct inspections on equipment that are found to be in abnormal condition.

- Reduce CO₂ emissions by reducing the amount of parts procured.
- Reduce the number of opportunities to be dispatched to the site, and reduce CO₂ emissions from the vehicle.

4. Environmentally friendly substation

4. 2. Vacuum Circuit Breaker (VCB)



- ✓ We have been using VCBs for 6.6 kV circuit breakers since the 1960's.
- ✓ More than 16,000 units of VCBs are in use, contributing to the reduction of GHG emissions.
- ✓ The 77 kV VCB uses dry air as the insulating medium instead of SF₆ gas, and a vacuum valve is applied to the breaker. Since dry air with a GWP of zero is adopted, it contributes to GHG reduction by eliminating SF₆ gas.

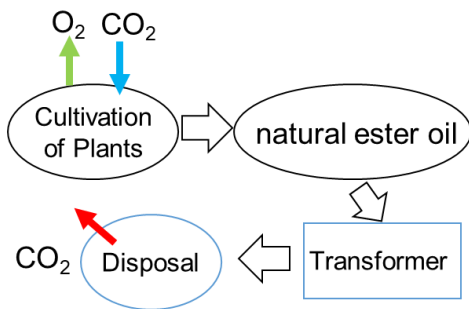


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4. Environmentally friendly substation

4. 3. Natural ester oil transformer



Natural ester oil from vegetable

- ✓ Reduce CO₂ emissions throughout the life cycle
- ✓ Higher flash point
reduce the risk of fire
- ✓ More biodegradable
increases the understanding of local residents and
reduces environmental impact

Carbon dioxide absorbed while plant grows (↓)
 +
 Carbon dioxide generated by the disposal of oil (↑)
 ≈ 0

URL: <https://www.kitashiba.co.jp/english/powersystem/transformer/>

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5. Conclusion

Promotion of the introduction of renewable energy

- ✓ Japanese government has raised the target for the installation of renewable energy as a percentage of power sources from 22-24% to 36-38% in FY2030.
- ✓ The installation of PV is increasing in our supply area, and the new substation is needed to interconnect more PV.

Environmentally friendly substation

- ✓ We will reduce GHG emissions with using vacuum circuit breaker and natural ester oil transformer.
- ✓ We will switch to condition based maintenance with IoT sensors, and
 - reduce CO₂ emissions by reducing the amount of parts procured
 - reduce the number of opportunities to be dispatched to the site, and reduce CO₂ emissions from the vehicle