

Paris Session 2022



Application of Voltage Control System for Distribution Network with mass interconnection of PV

C6 PS2 - INNOVATIVE PLANNING AND OPERATION OF ACTIVE
DISTRIBUTION SYSTEMS

Q2.7

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Group Discussion Meeting

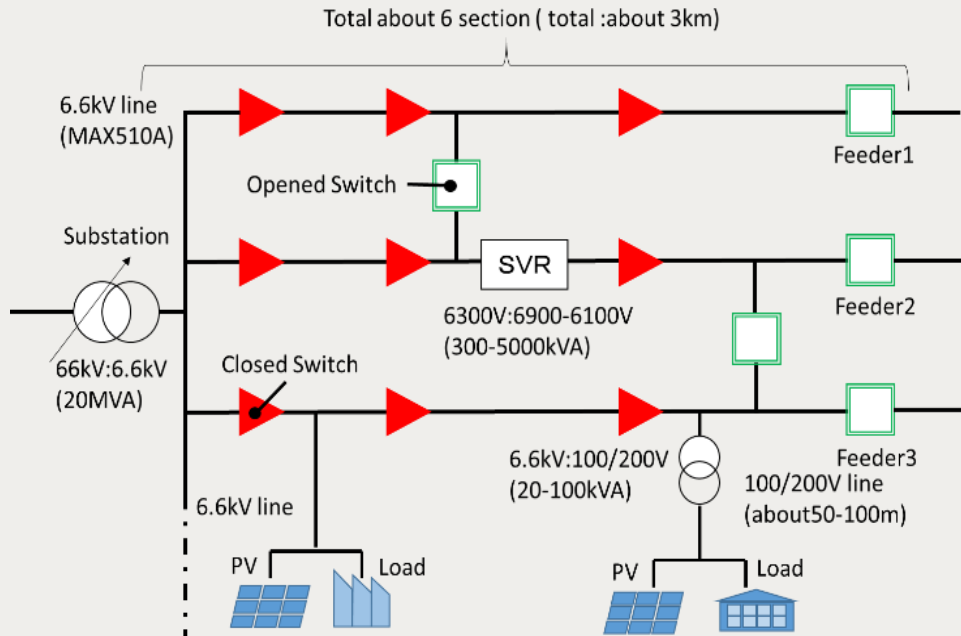
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Voltage control method in Japan

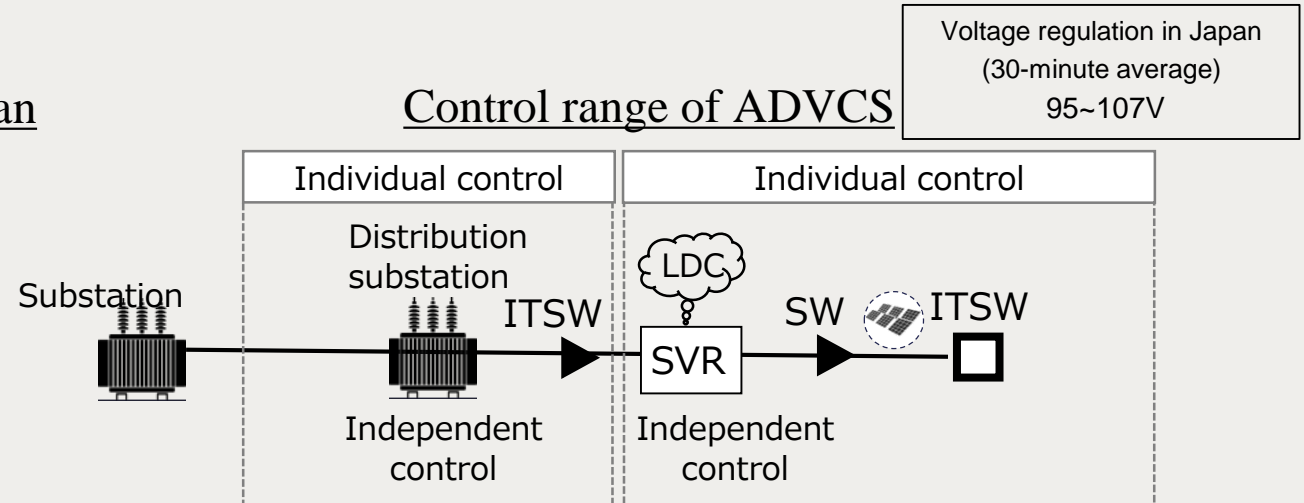
- In Japan, a voltage control device installed in the distribution system adopts an independent control method (ADVCS: Autonomous Decentralized Voltage Control System), and the control amount is determined individually.

Standard configuration of distribution network in Japan



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Control range of ADVCS

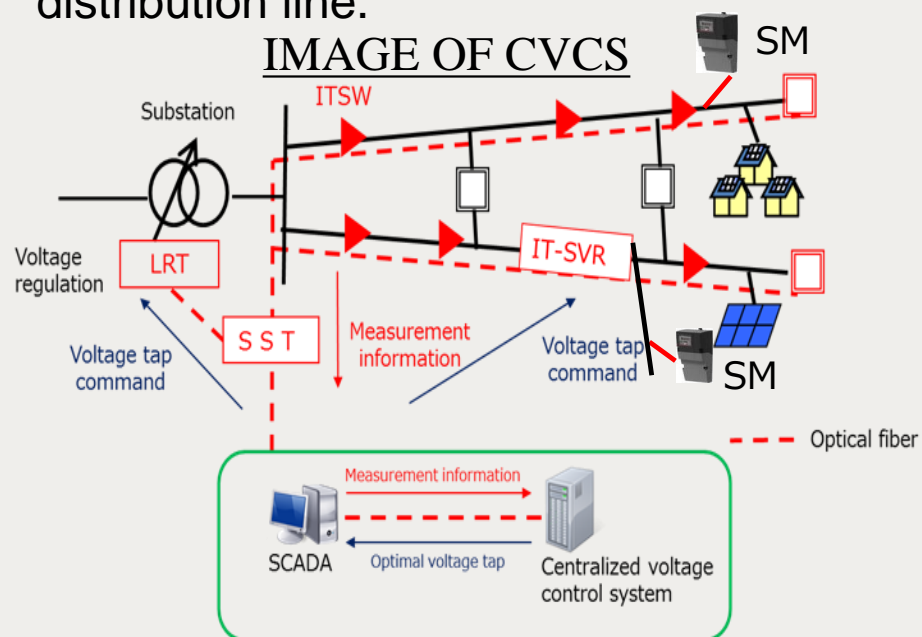


With the expansion of implementation of renewable energy like PV, the voltage fluctuation in the distribution system is expanding.

⇒ Compare the centralized voltage control system based on batch control of voltage control equipment that is being introduced in Japan, and the independent control method (ADVCS).

Centralized Voltage Control System (CVCS)

- CVCS is a calculation system that performs optimum control of each voltage controller based on measurement data at each point of the distribution line provided from Distribution Automation System.
- Demonstration of CVCS is underway with LTR, which has remote control function and measurement/communication function, and ITSW, which is installed for the first section switch on distribution line.



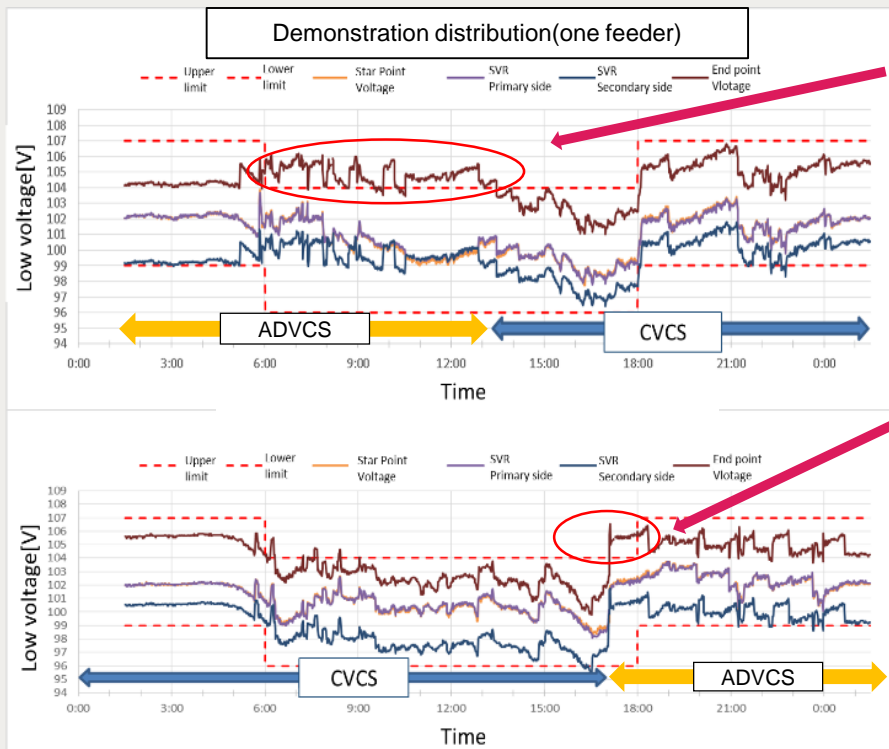
- Final configuration of CVCS will be formed of LRT, SVR, which are equipped with remote control function and measurement/communication function. And all the switches in a distribution line will be replaced with ITSW.
- In addition, studies are underway to improve the accuracy of the upper and lower voltage values specified by CVCS using smart meta data.

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Result

- Compared ADVCS and CVCS with demonstration on actual distribution lines.
- Verified control effect of CVCS on actual distribution line where voltage deviation occurs due to PV interconnection.

Test Result



- Power generation time -6:00~18:00
- The voltage during the power generation time in ADVCS exceeds the specified value

The Voltage Deviation Amount and the Number of TAP Actions

| ADVCS 13/1/2020 CVCS 16/1/2020 | The number of tap action [number/day] | | Total voltage deviation amount [V /30min * number of ITSW] |
|-----------------------------------|---------------------------------------|-----|--|
| | LRT | SVR | |
| ADVCS | 10 | 23 | 2.6 |
| CVCS | 6 | 4 | 0.0 |

Demonstration results

- The number of tap changes has decreased
- Voltage deviation is eliminated

Summary

- CVCS is effective for distribution lines with a large amount of renewable energy because voltage deviation occurs due to reverse power flow on fine weather day.

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