2011 GREEN DATA CENTRE FORUM

HVDC (High Voltage Direct Current)

NTT DATA

New Feeding Method for High Efficiency Data Centre

Background

- APEC at Yokohama JAPAN （Nov. 2010）

  One of the Action list supporting the APEC leaders' strategic growth is,

  ・Promote energy conservation activities through the introduction of more energy efficient ICT devices and systems, including data centres and ICT utilization in many sectors and new ICT services such as cloud computing (Green ICT).

- Recently, the situation at the data centre has widely changed.
  - •Support for environmental protection
  - • Initiatives to Green ICT
  - •Correspondence to ICT technology with fast advancement.

- To achieve the Green data centre.
  - •Air-conditioning efficiency improvement
  - •Server consolidation by virtualization
  - •High Voltage Direct Current (HVDC)

It is possible to achieve it by HVDC.

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1. Energy-saving design

Comprehensive efficiency
２０~３５% improvement!
Naturally, the electricity bill of operating is reduced and The CO2 emissions significantly reduced!

2. High-reliability design

UPS is unnecessary.
The system down is prevented by the n+1 composition.

3. Safety design

The electric shock, an earth fault, and the arc problem are cleared.

Power Supply Rack （small-sized ！From 1/5 to 1/10 compared to UPS. ！

Server Racks

高電圧直流給電システム
FRESH HVDC

1．Energy-saving design

－　Efficiency comparison　－

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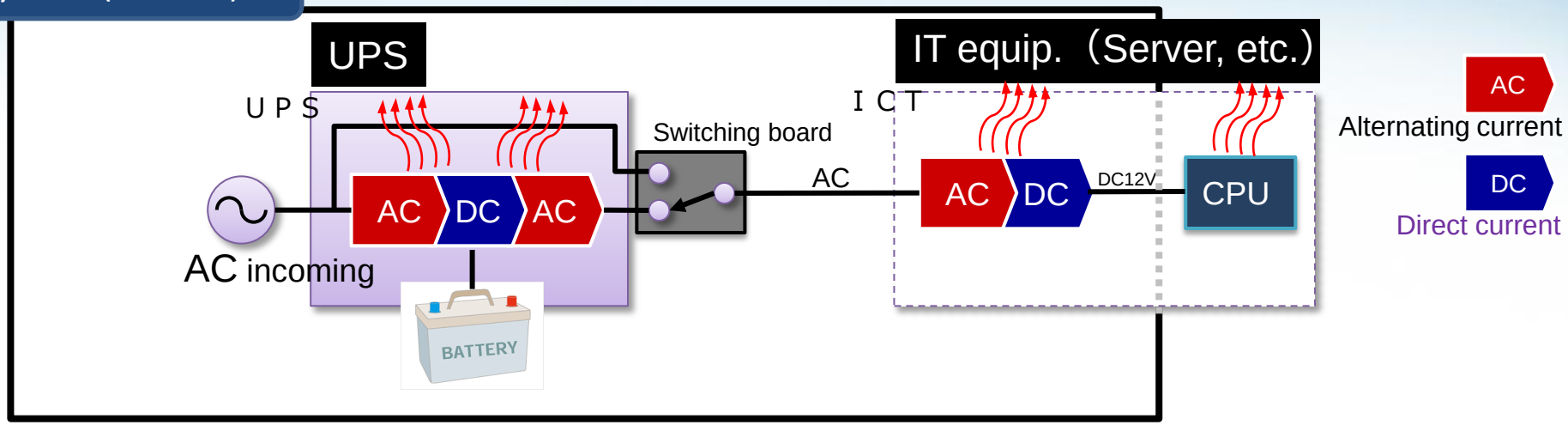
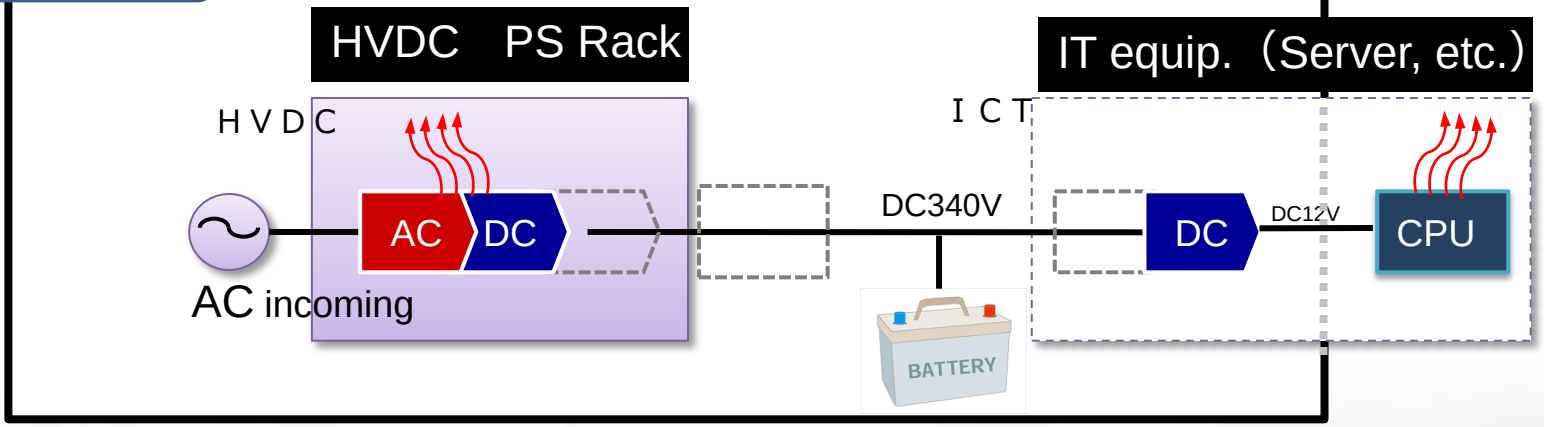
UPS system (current)



HVDC



- ***Two conversions are eliminated.***
- ***Significant energy saving.***
- ***Further improved reliability.***

1．Energy-saving design
－　Efficiency comparison　－

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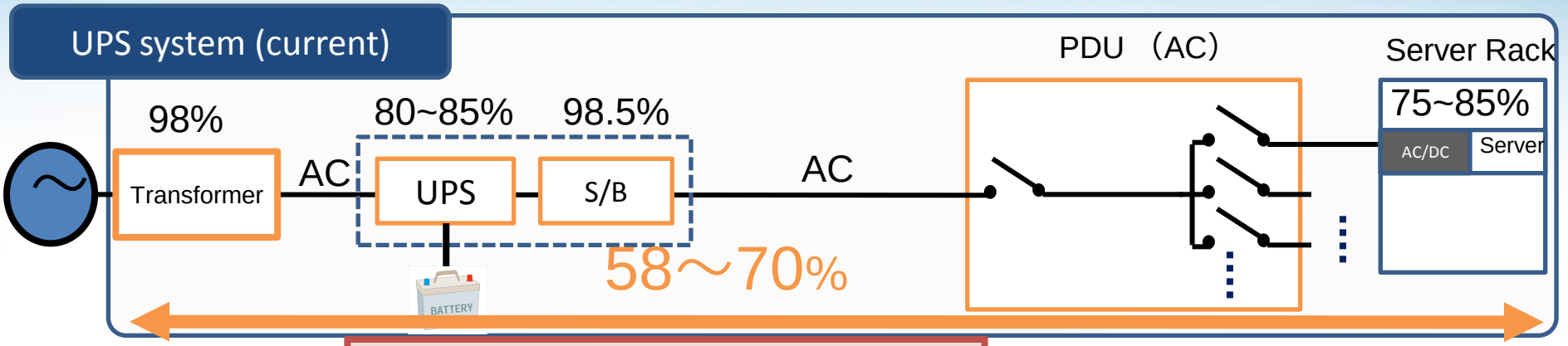
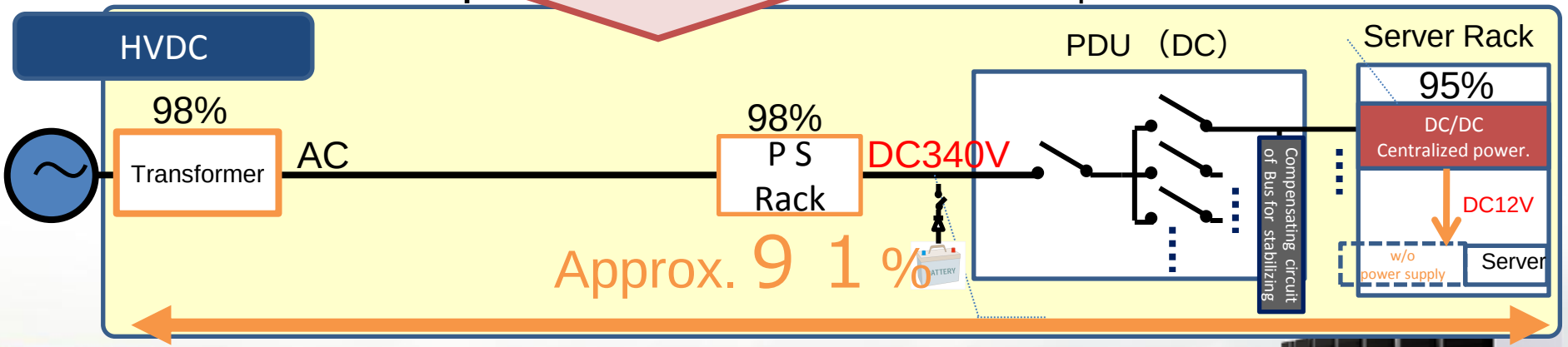


HVDC　12V systems is

２０～３５%

power reduction.

※The air conditioning power reduction also added!



※ Efficiency calculation is the reference on 50% load.
※ Value about the efficiency varies depending on the configuration.

2. High-reliability design

– n +1 The merit of redundancy –

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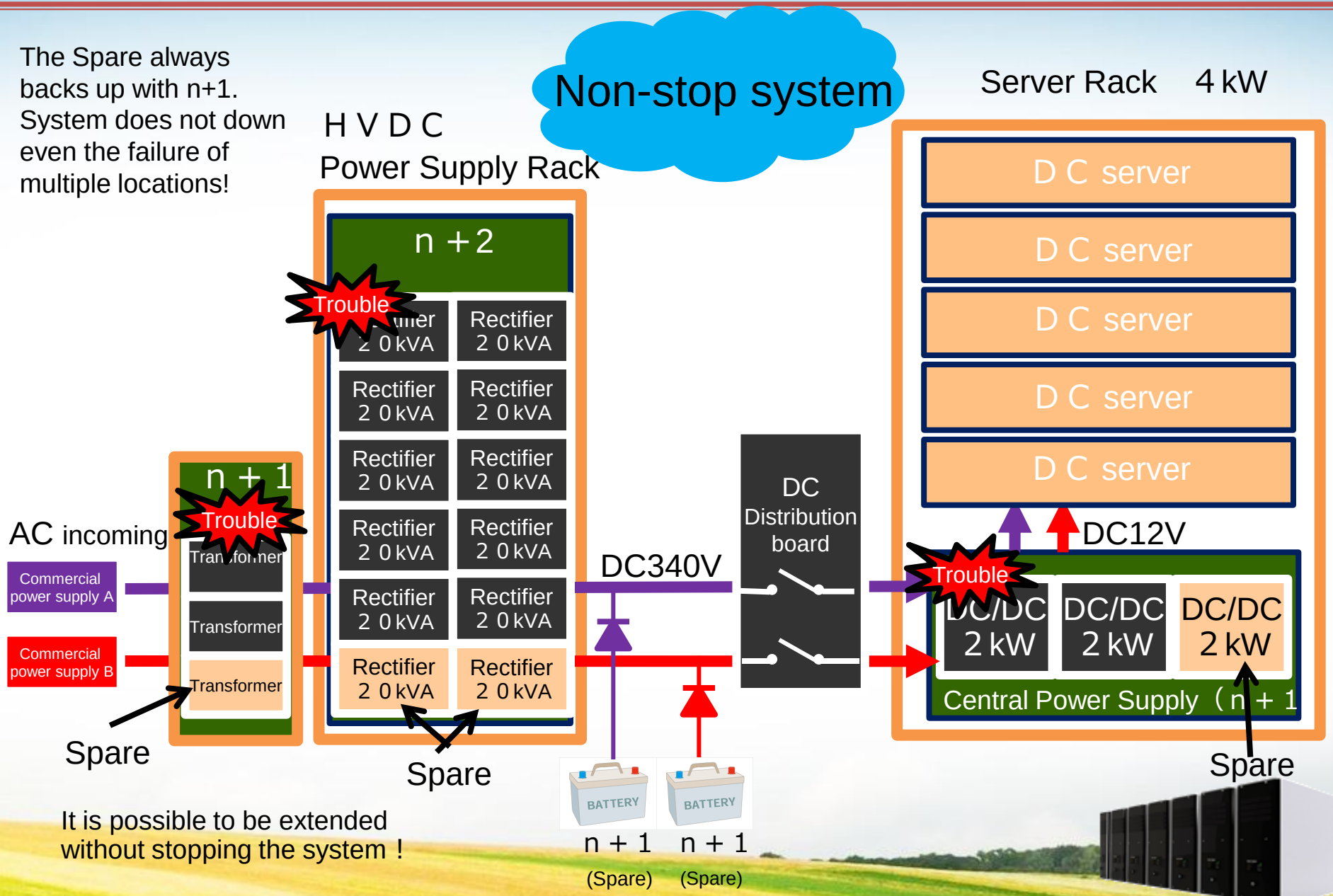
The Spare always backs up with n+1. System does not down even the failure of multiple locations!



It is possible to be extended without stopping the system !

3． Safety design

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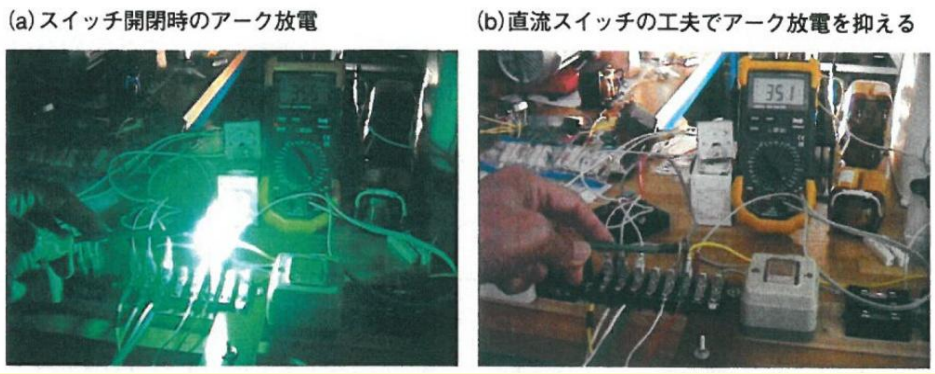
We achieved "Safety" by our new technology , HVDC !

① ARC Restraint Technology

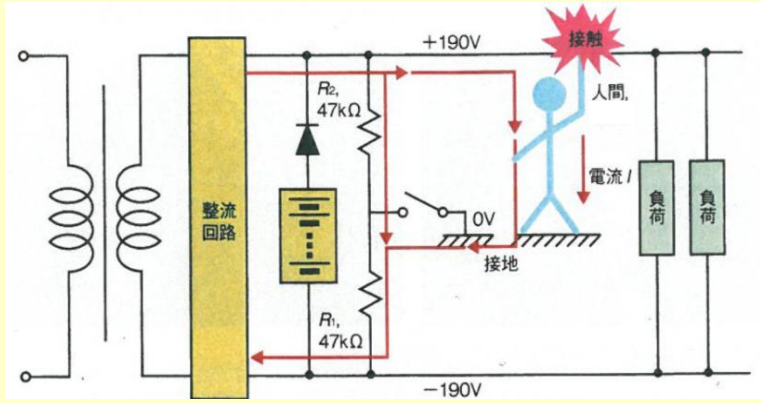


・By setting the arc control circuit, suppress the generation of the arc.

Arc outbreak at the time of the direct current interception had been a problem.

②Middle point ground

Anti-electric shock・earth measure



・An electric shock, an earth fault with high voltage are limited on a secure current value by the high resistivity of 47kΩ.

Danger associated with the high voltage had been pointed out.

Electric shock and earth fault protection
– Middle point ground –

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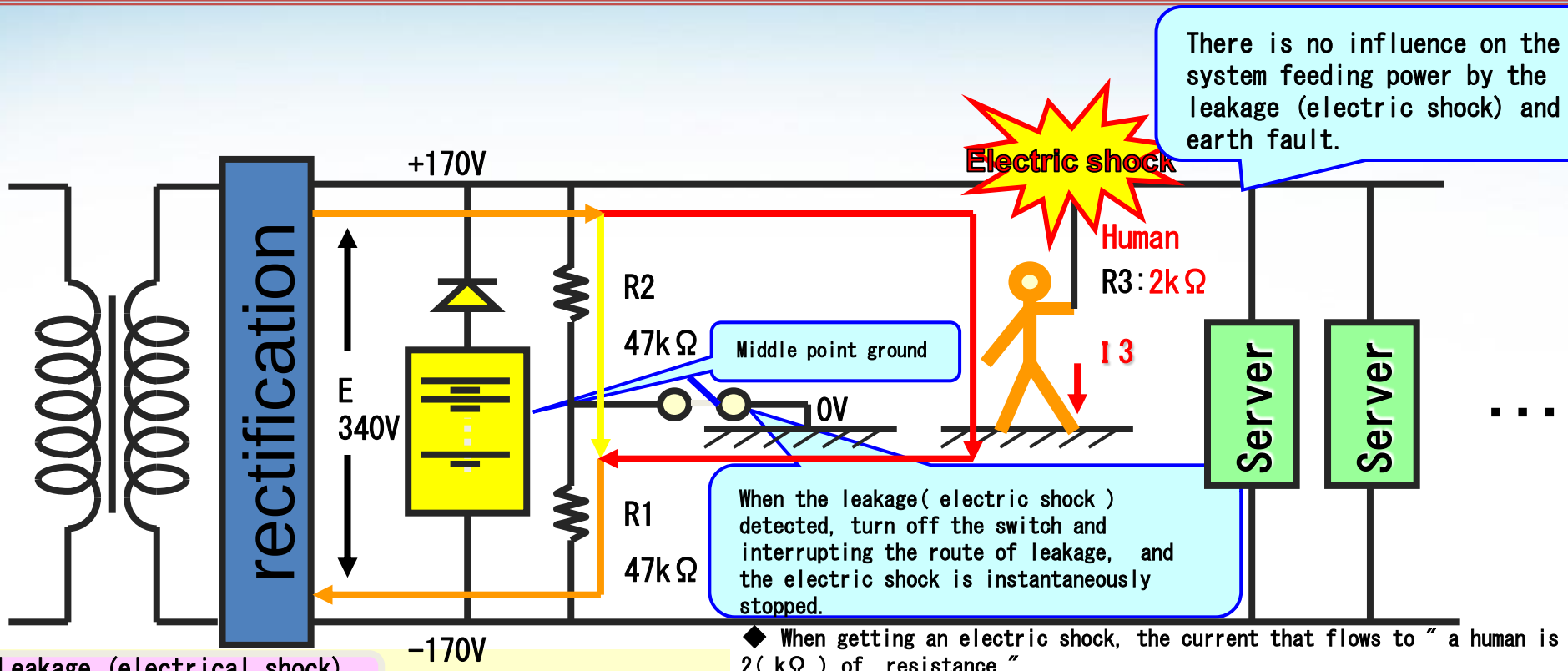
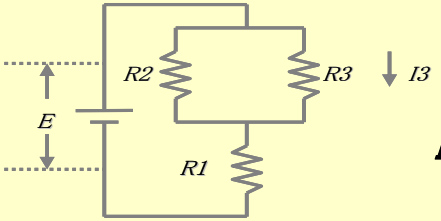


◆ When getting an electric shock, the current that flows to " a human is 2(kΩ) of resistance ".

Leakage (electrical shock) at equivalent circuit.



Calculating formula

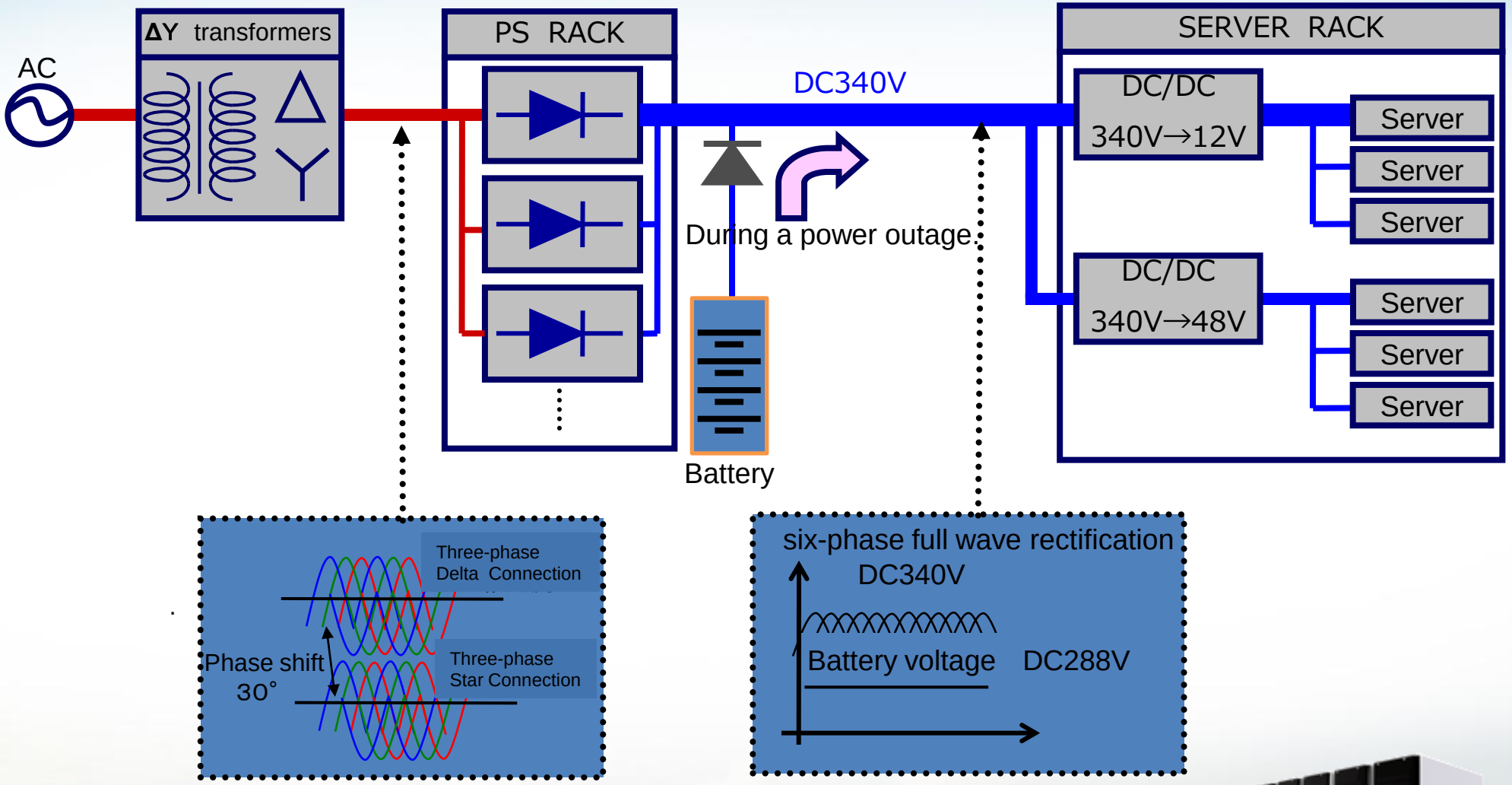
$$I3 = \frac{E \times R2}{R1 \times (R2+R3) + R2 \times R3}$$

$$I3 = \frac{380V \times 47k\Omega}{47k\Omega \times (47k\Omega+2k\Omega)+47k\Omega \times 2k\Omega} = 7.5\ mA$$

※In an actual device, short time peak current flows by the load.
However, we solved in discharge circuit.

◆ *We developed high-resistance grounding method aimed at high-voltage electric shock accident prevention.*

HVDC – Basic system configuration



HVDC – Floor Configuration –

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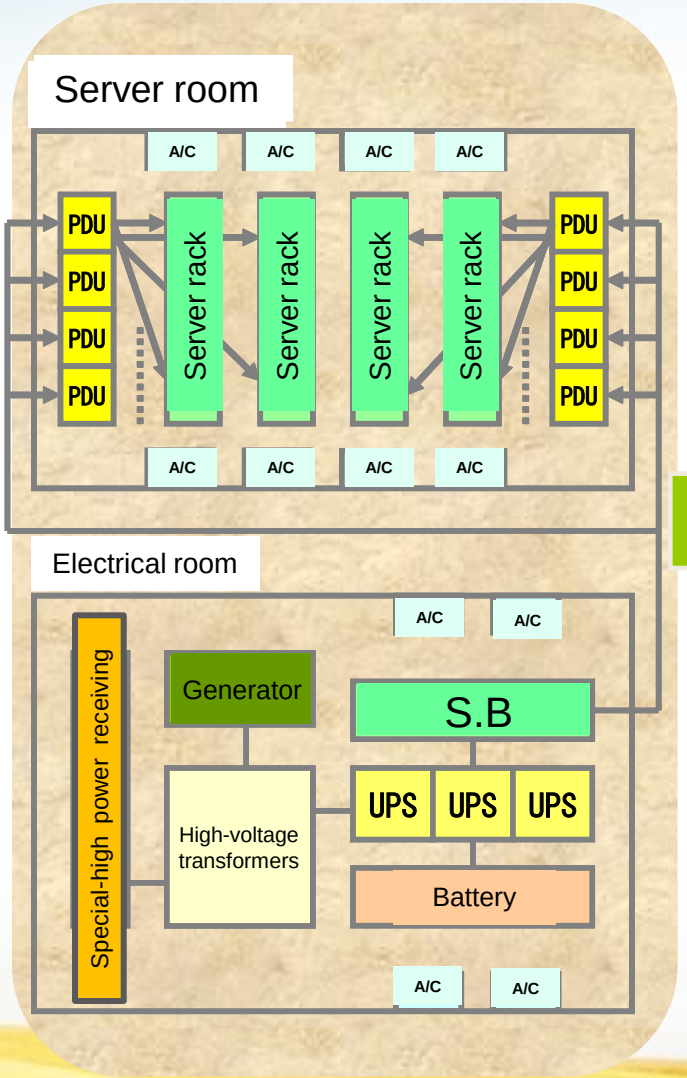
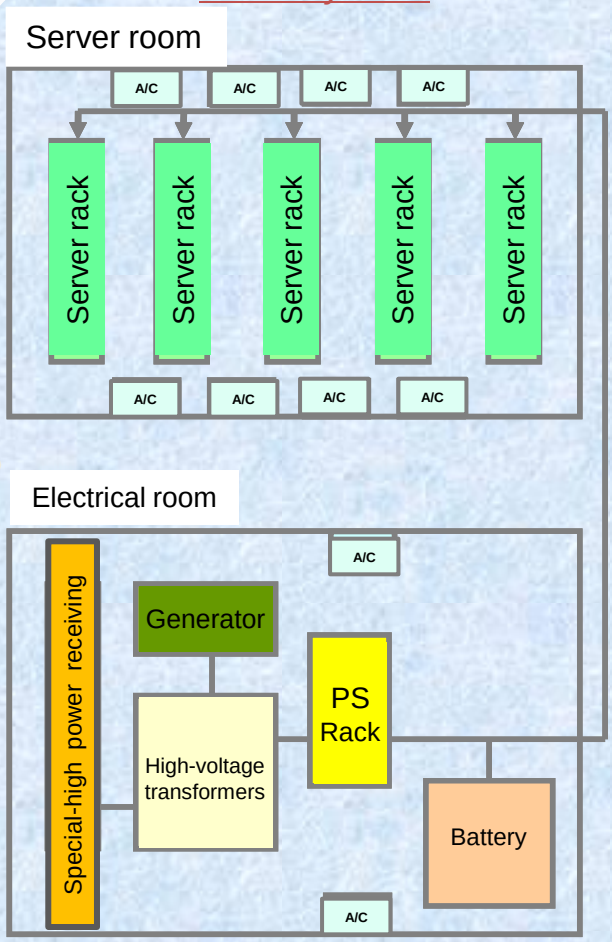
Conventional AC ・UPS systems

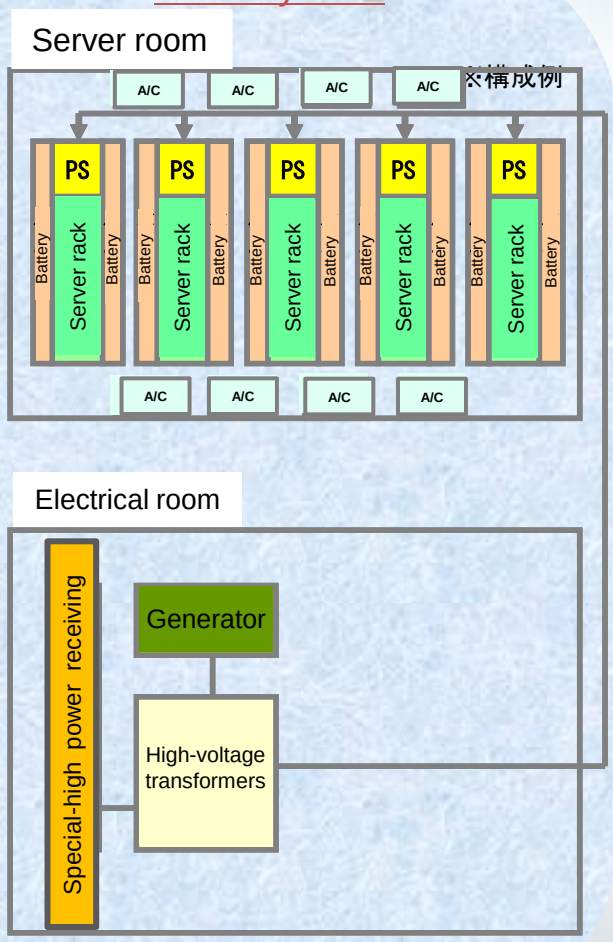


HVDC systems

Floor layout 1



Floor layout 2



Result of JAPAN

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■Major data center company A

- This company constructs the data center of 4000 racks scale in the autumn of this year.

■Major data center company B

- This company is examining the introduction at the beginning of next year .

■Major carrier C

- The evaluation machine was introduced.

Suggestions

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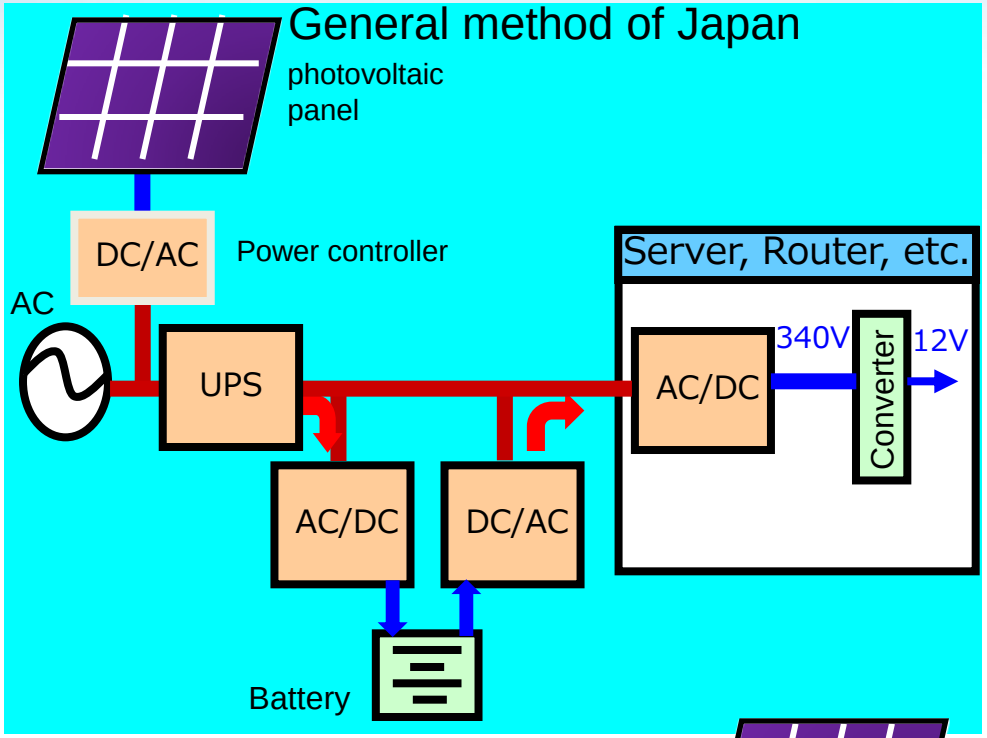
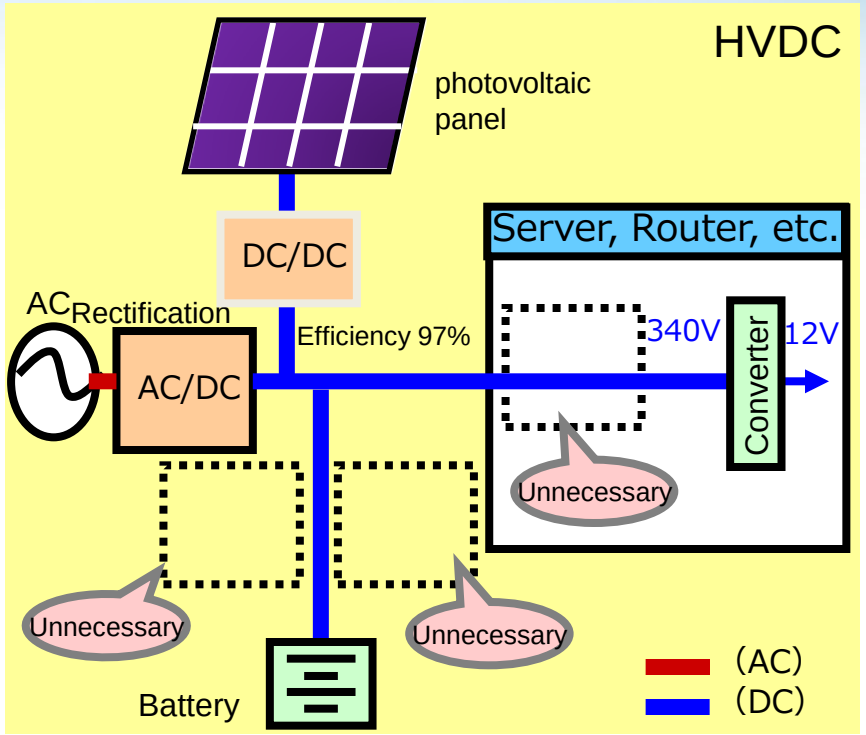
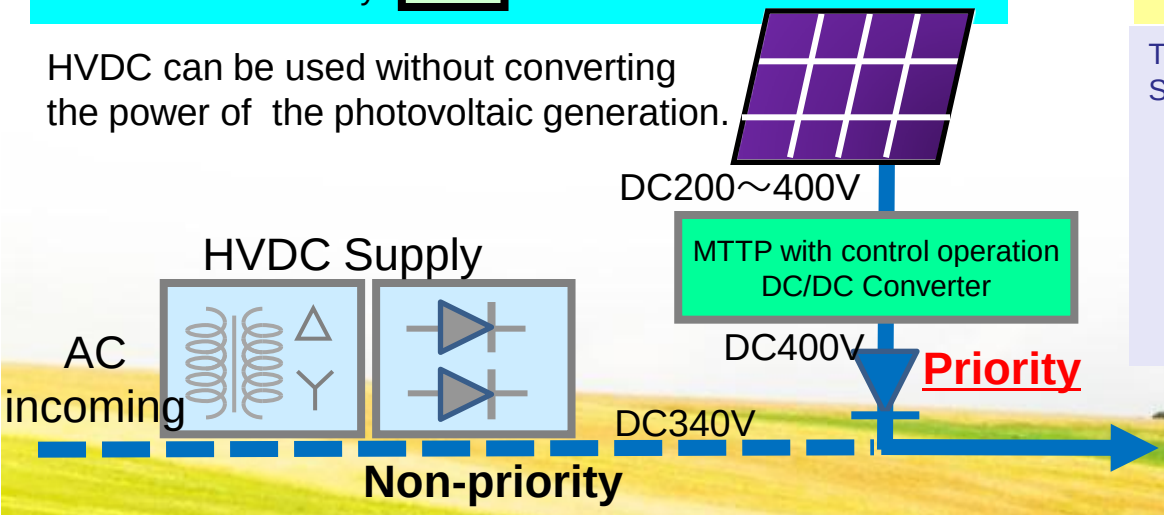
The photovoltaic generation Installation.





HVDC can be used without converting the power of the photovoltaic generation.



The output of the photovoltaic panel is a high voltage,
So the HVDC data centre is a good combination !

- No power controller
  Highly effective, high reliability, and low price !
- As running out of the photovoltaic generation power, the electric power is automatically supplied from the AC system side.
- HVDC does not flow back to the AC system in waveform troubled!

If you have any interest in our products, please feel free to contact the following address.

Thank you for your attention.

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