

Power of FORTELION™ for Stable Energy

Murata Manufacturing Co., Ltd.
Noritoshi Imamura



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Content

- Advantages of FORTELION™
- ESS powered by FORTELION™
- Example of Installation



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Various Lithium-Ion Battery



	LTO	LFP	LCO	NCM	NCA
Main companies of ESS	TOSHIBA (SCiB)	FORTELION		LG, Samsung, Tesla	Tesla
Cathode	NCM series	LiFePO ₄	LiCoO ₂	LiNiCoMnO ₂	LiNiCoAlO ₂
Anode	LTO	Graphite	Graphite	Graphite	Graphite
Advantage	<ul style="list-style-type: none"> • Quick charge • Low temp. charge 	<ul style="list-style-type: none"> • Long life • Extreme safety 	<ul style="list-style-type: none"> • High voltage 	<ul style="list-style-type: none"> Low cost High energy density 	<ul style="list-style-type: none"> High energy density
Disadvantage	<ul style="list-style-type: none"> • Low energy density • High cost 	<ul style="list-style-type: none"> • Low voltage • Low energy density 	<ul style="list-style-type: none"> • Higher cost • Low safety • Limited resource 	<ul style="list-style-type: none"> • Low temp. • Limited resource 	<ul style="list-style-type: none"> • Low safety • Limited resource
Application					

Advantages of FORTELION™



- 1 Inherent safety
(No thermal runaway)
- 2 Long calendar life
(15 years)
- 3 Long cycle life
(70 % 14,000 cycles)
- 4 Quick charging
- 5 Eco-friendly

FORTELION



Advantages of FORTELION™



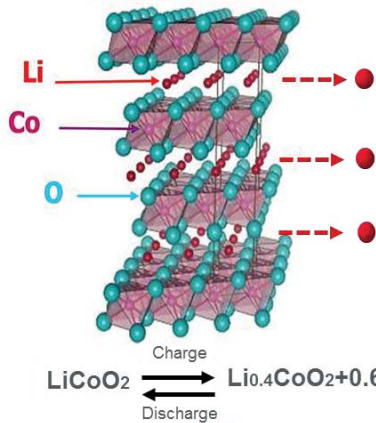
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FORTELION



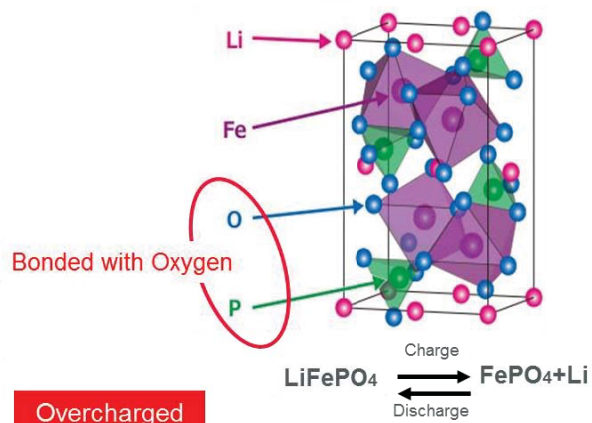
LCO/NCM/NCA

Layer structure

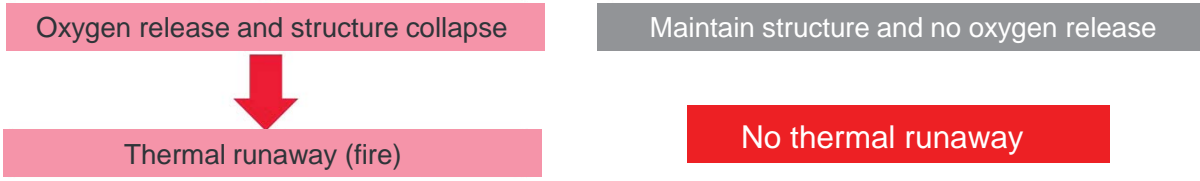


FORTELION (LFP)

Olivine structure



Overcharged & Heat the cell

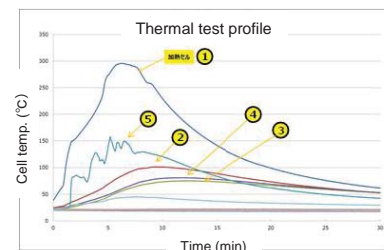
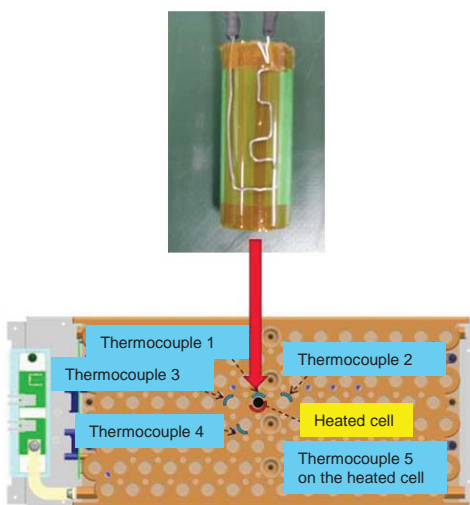


Propagation test in Murata module

Heat a cell in a Murata module to forcefully cause thermal runaway using a connected nichrome wire

Test methods

Pictures after the test, thermal profiles during the test



Cell with nichrome wire is put into a Murata module, then heated up by applying electricity to the wire.

No ruptures or combustion is found in the module. Though we found a slight damage on the surrounding cells, there was no propagation that affected safety.

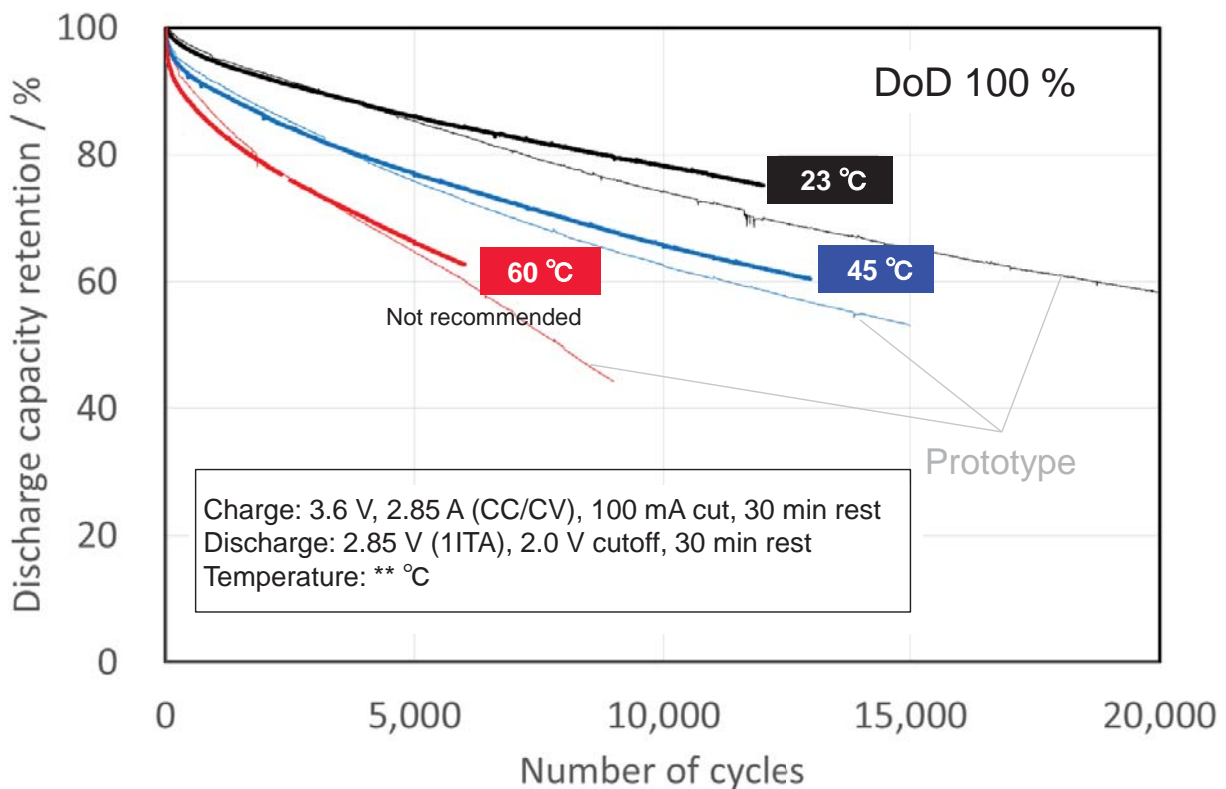


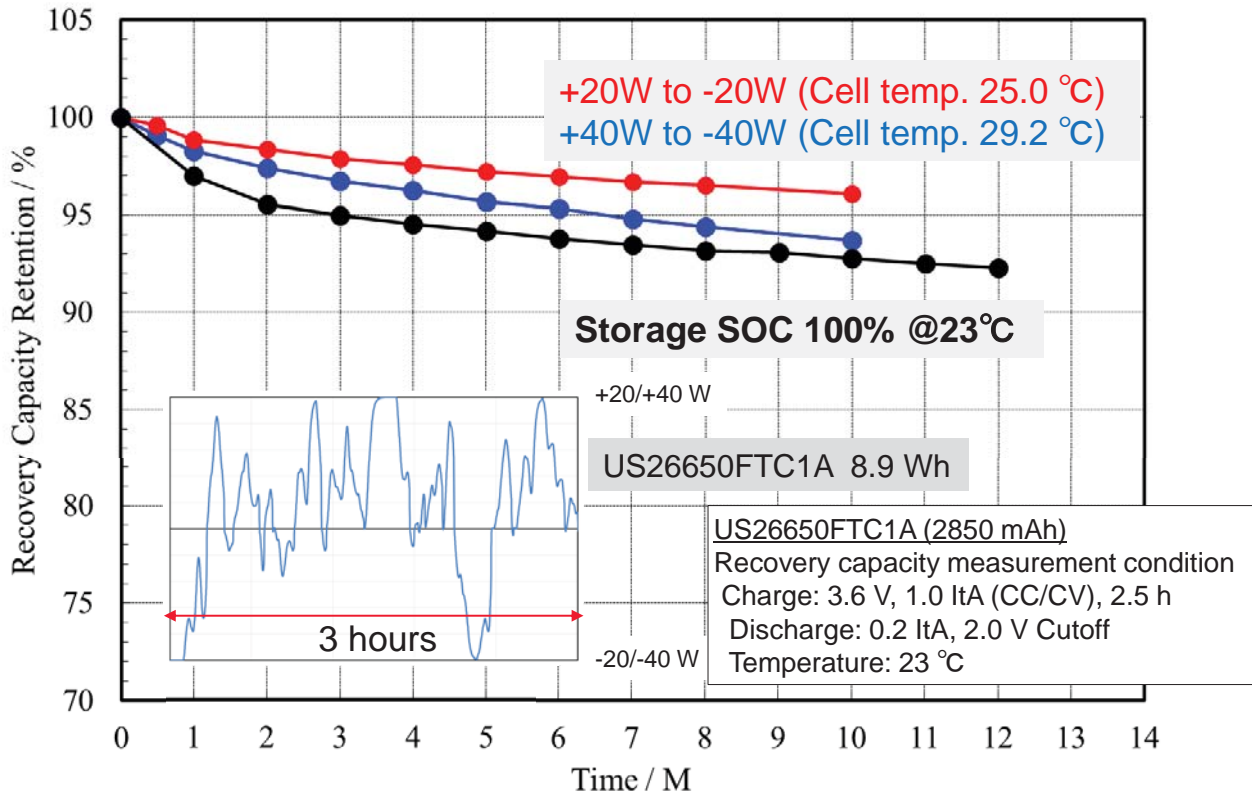
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Cycle Characteristics of FORTELION™





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New high power module by FORTELION™



- 200A Discharge (6C-rate) & 100A Charge(3C-rate)available
- High accuracy life time prediction
- Self-diagnostic and battery cell balancing
- High scalability and small Space



- Continuous insulation voltage 1500V
- Operating temperature -20-50 °C
- Expected life of over 15 years
- UL9540A for the risk of fire tested with FORTELION™ cell

Application



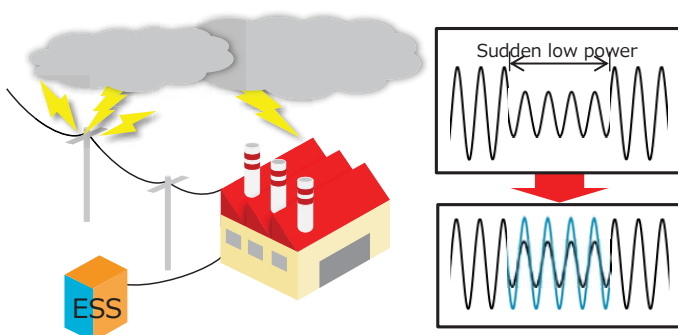
Ideal applications requiring high output for short duration (10~30 min)



Instantaneous high power backup

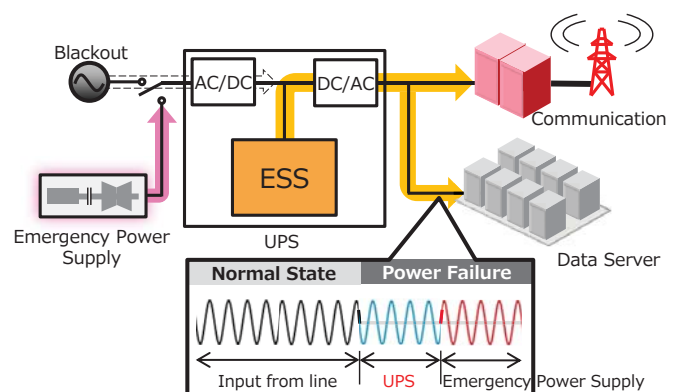
① Instantaneous measure

Example: Factory in areas of frequent thunder



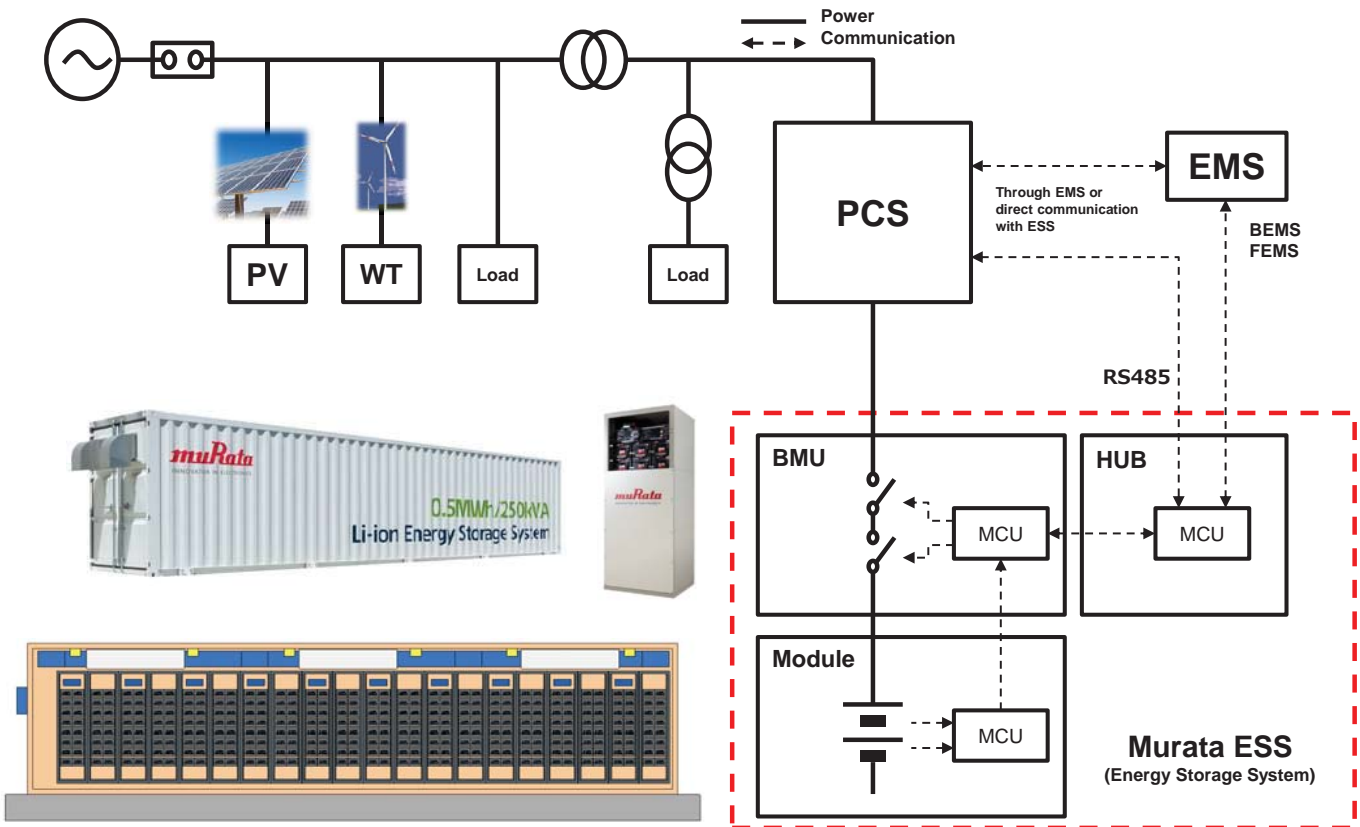
② Used as UPS

Example: TV Station, Mobile Base Station, Data Center

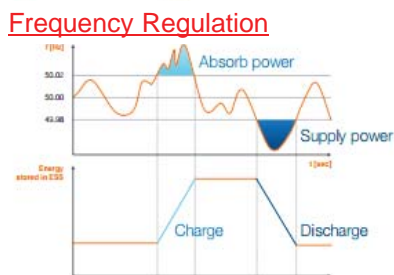


10~30 min discharge available immediately after power failure

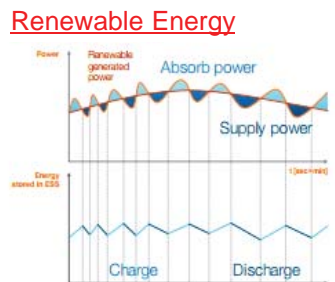
Configuration Example



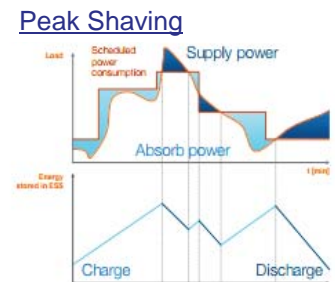
Utility Use Case of ESS



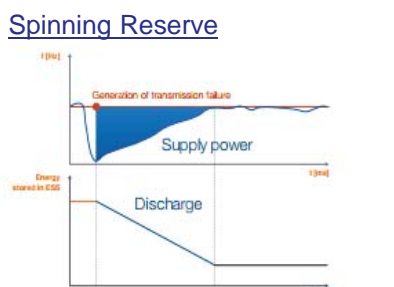
Adjust frequency by ESS quick Charge / Discharge



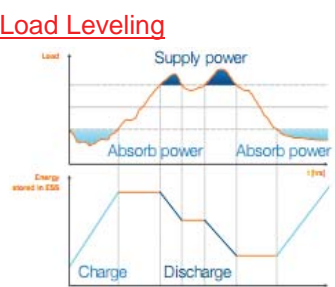
Stabilize Renewable Generated Energy



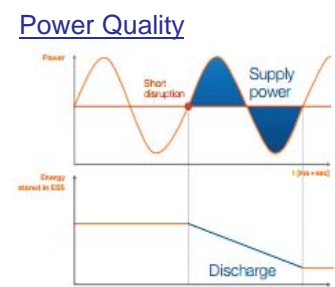
Cut peak power to save Investment cost



Reserve power under emergency



Storage power under low usage time



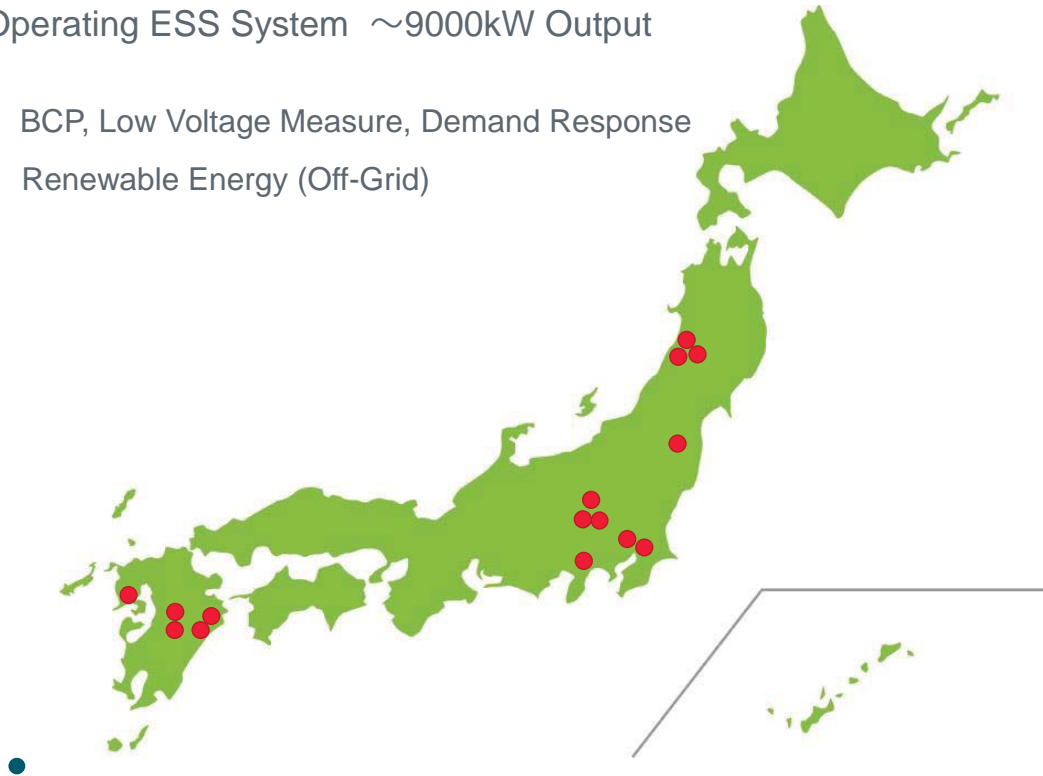
Keep power quality under emergency

Source: ABB Website

Murata MW Energy Storage System

Operating ESS System ~9000kW Output

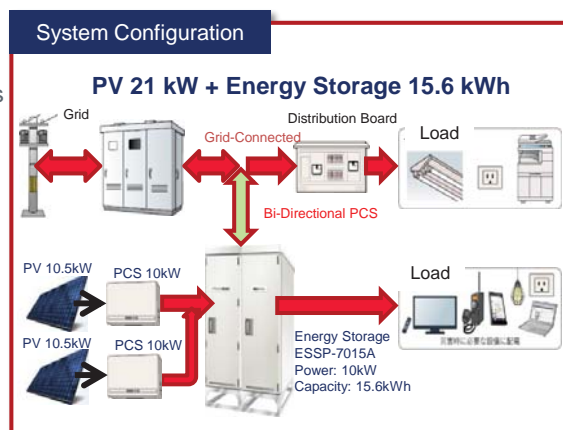
- BCP, Low Voltage Measure, Demand Response
- Renewable Energy (Off-Grid)



UPS/Backup in Japan

➤ Stable power supply of disaster, Power Outage, Instantaneous voltage drop

- Example
TOKYO Fire Department selects FORTELION™.



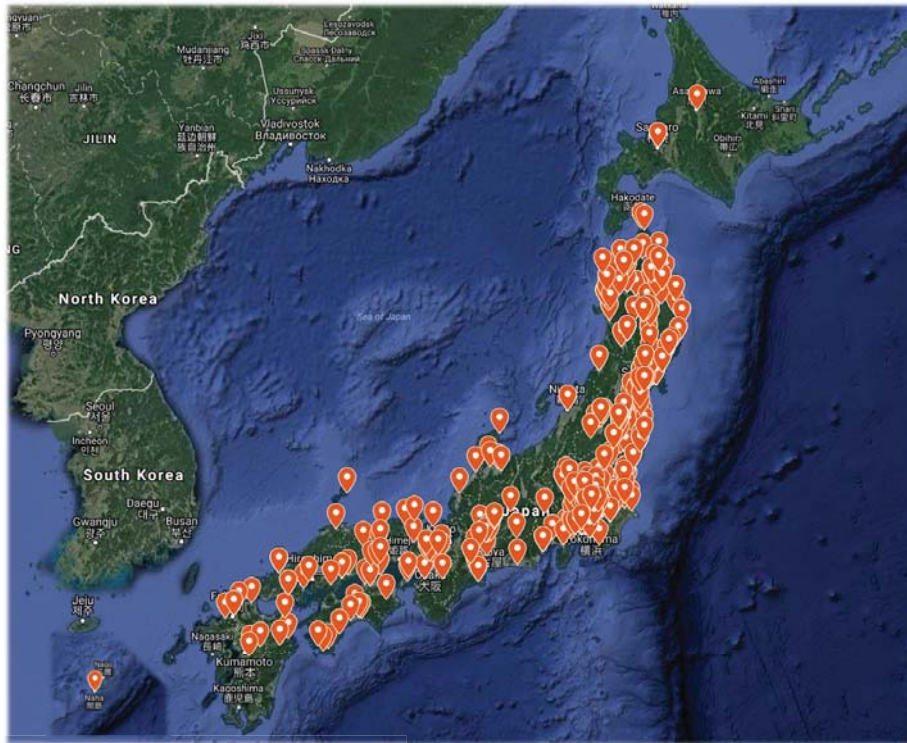
- Example
152 public schools installed in Saitama city.
TTL energy storage capacity :2.4MWh



More than 1,500 systems in total have been introduced in Japan.



Murata's industrial battery energy storage are installed for factories, offices and public facilities.



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Off-grid in Australia



- Stable power supply to remote areas



330 kW solar PV, 620 kWh lithium energy storage, 4x100 kVA diesel

Off-grid in Australia



- Stable power supply to remote regions



Effective use of solar power and electric generator power

Off-grid in Singapore



- Stable power supply to remote regions



Operation can be performed without air conditioner even at high temperature.



Off-grid in Antarctic Base



- Stable power supply to remote areas

Antarctic base of Germany





- Stable power supply to remote facilities



Hut in Alps, Germany



Carried by Helicopter



Carried by Helicopter



Batteries and SMA Sunny Island

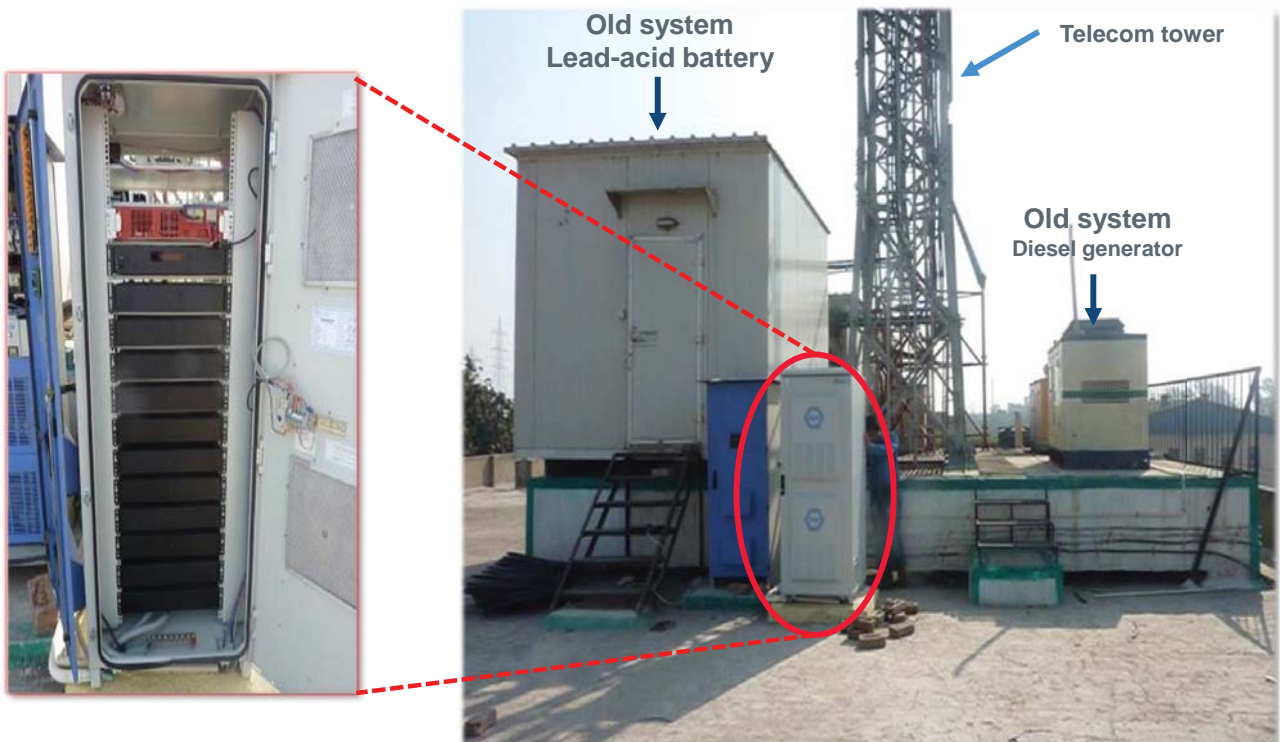


Manager of the Hutte and installer

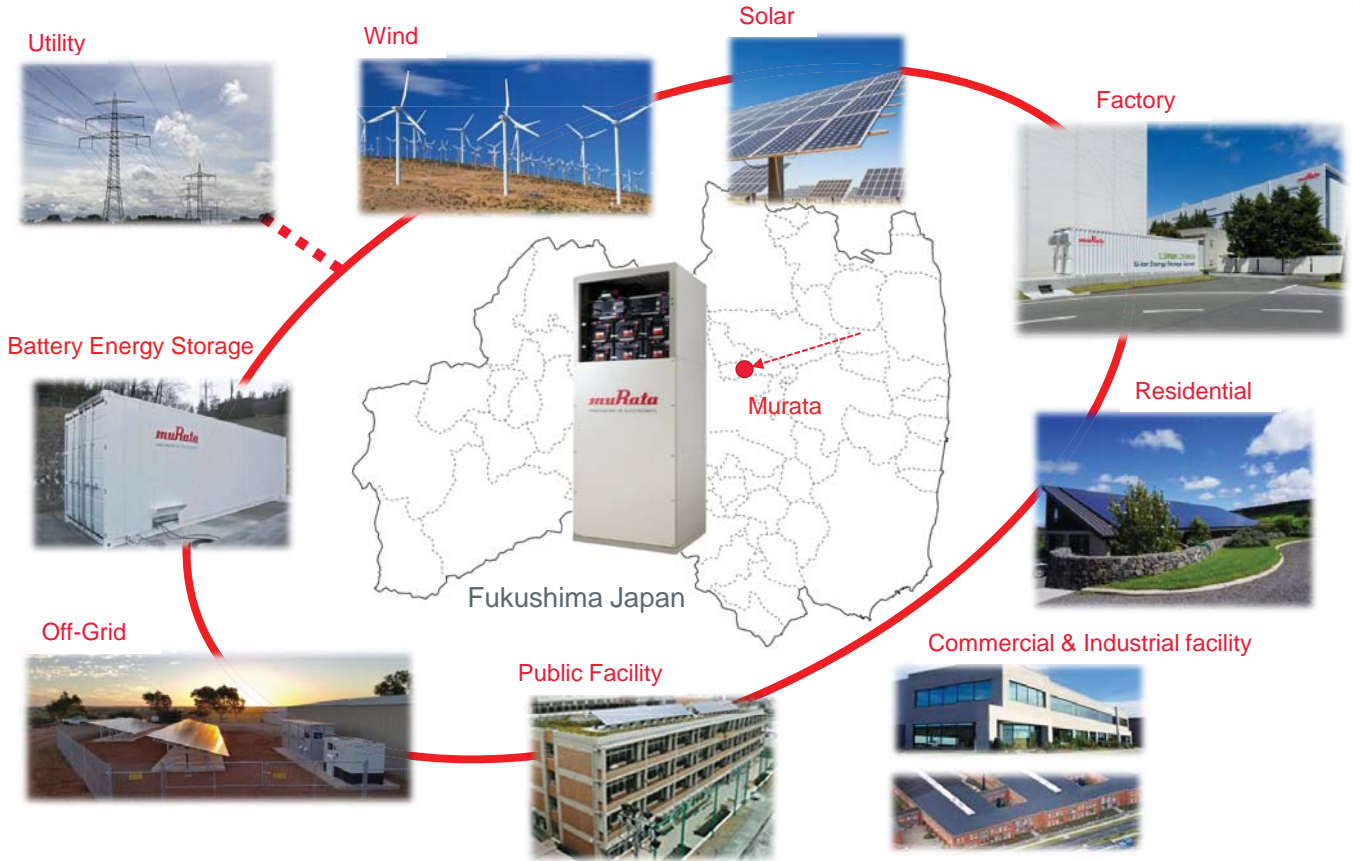
Replaced Pb batteries to lithium ion batteries to reduce frequency of using helicopter



- Stable power supply of disaster, Power outage, Instantaneous voltage drop



FORTELION™ for Renewable Energy



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Thank you