Japan's Resilient Energy Technology Micro-grid System

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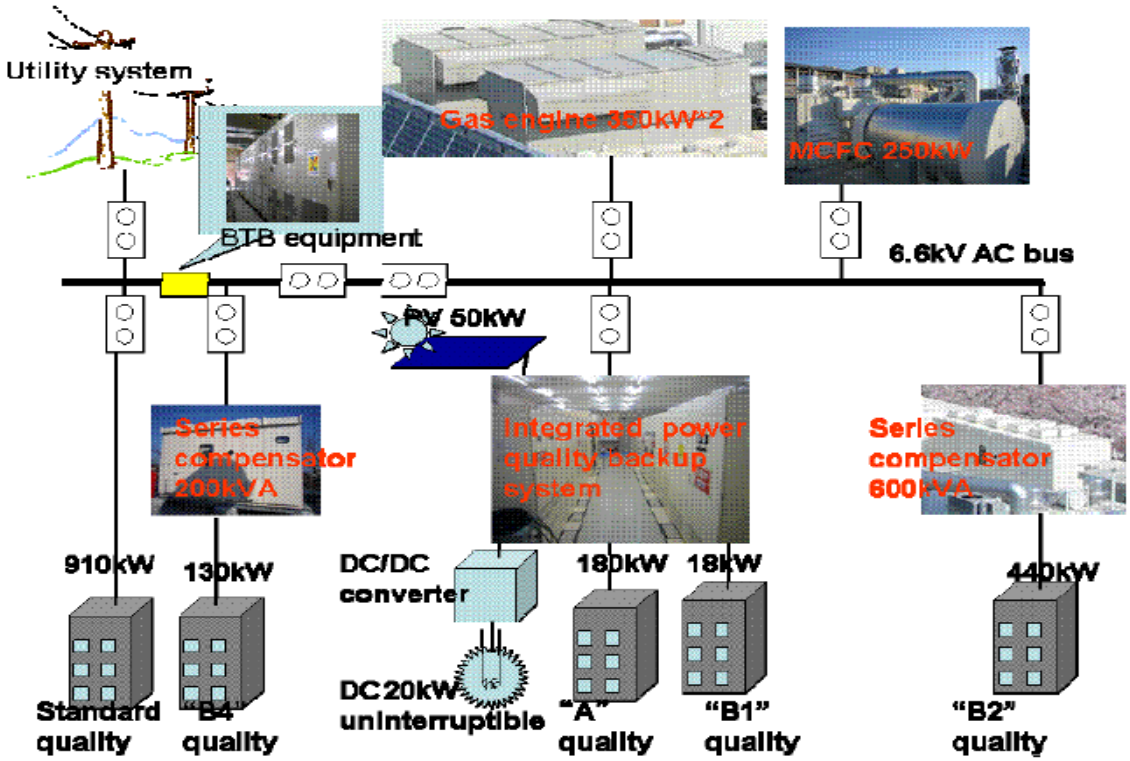
Microgrid in Sendai (FY2004-2007)

Demonstration Project on Power Supply System by Service Level



High Quality A

No Interruption. Compensating voltage at a wave level.

High Quality B

Removing interruption within 15 ms

Standard Quality C

Interruption is usually removed within 1 minute.

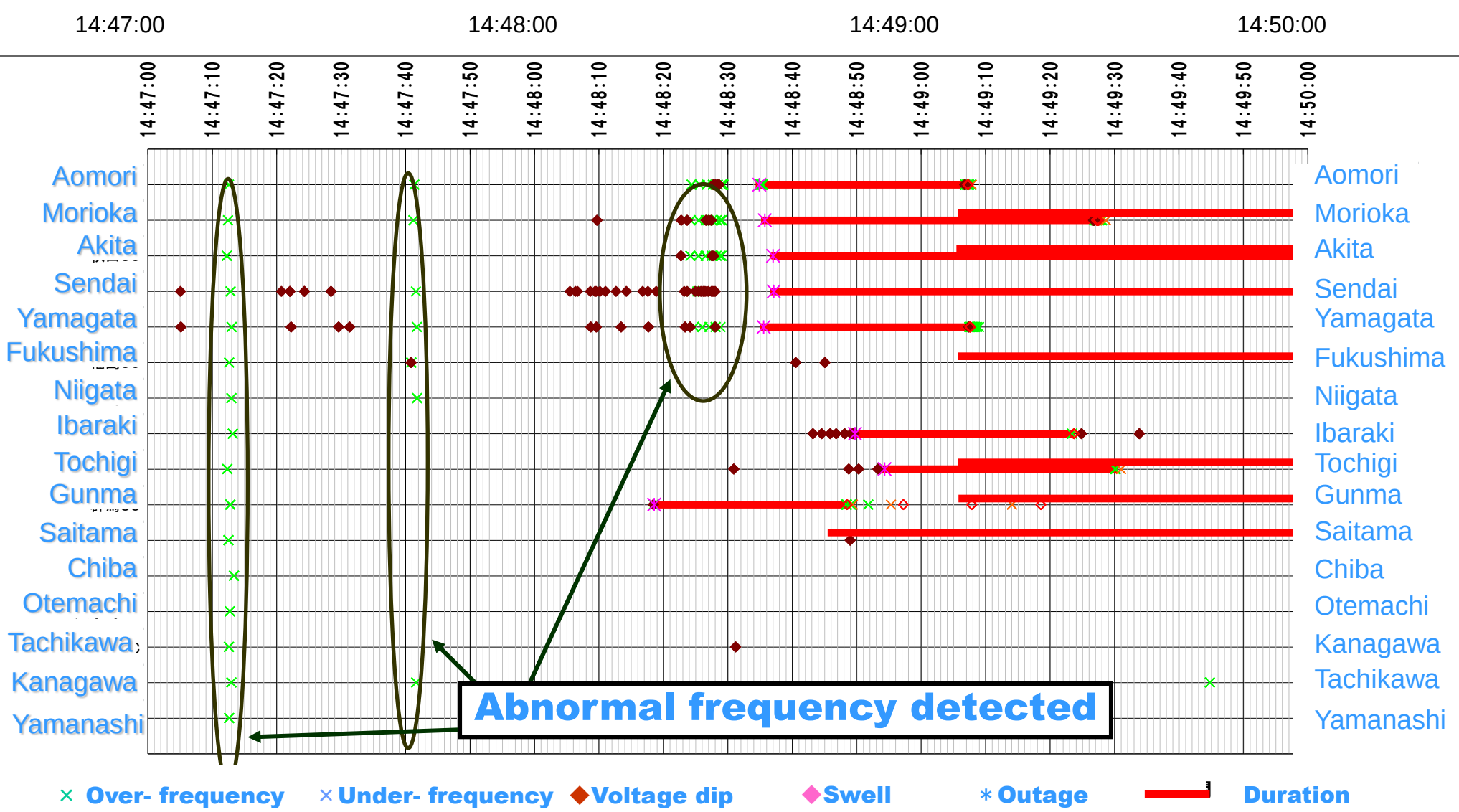
DC

No Interruption. DC supply.

- **Great East Japan Earthquake: 2:46 pm on March 11.**
- **Sendai system recovered before noon of March 12. And supply electricity to Hospital and High Quality A load (UPS).**
- **Utility system recovered at March 14.**

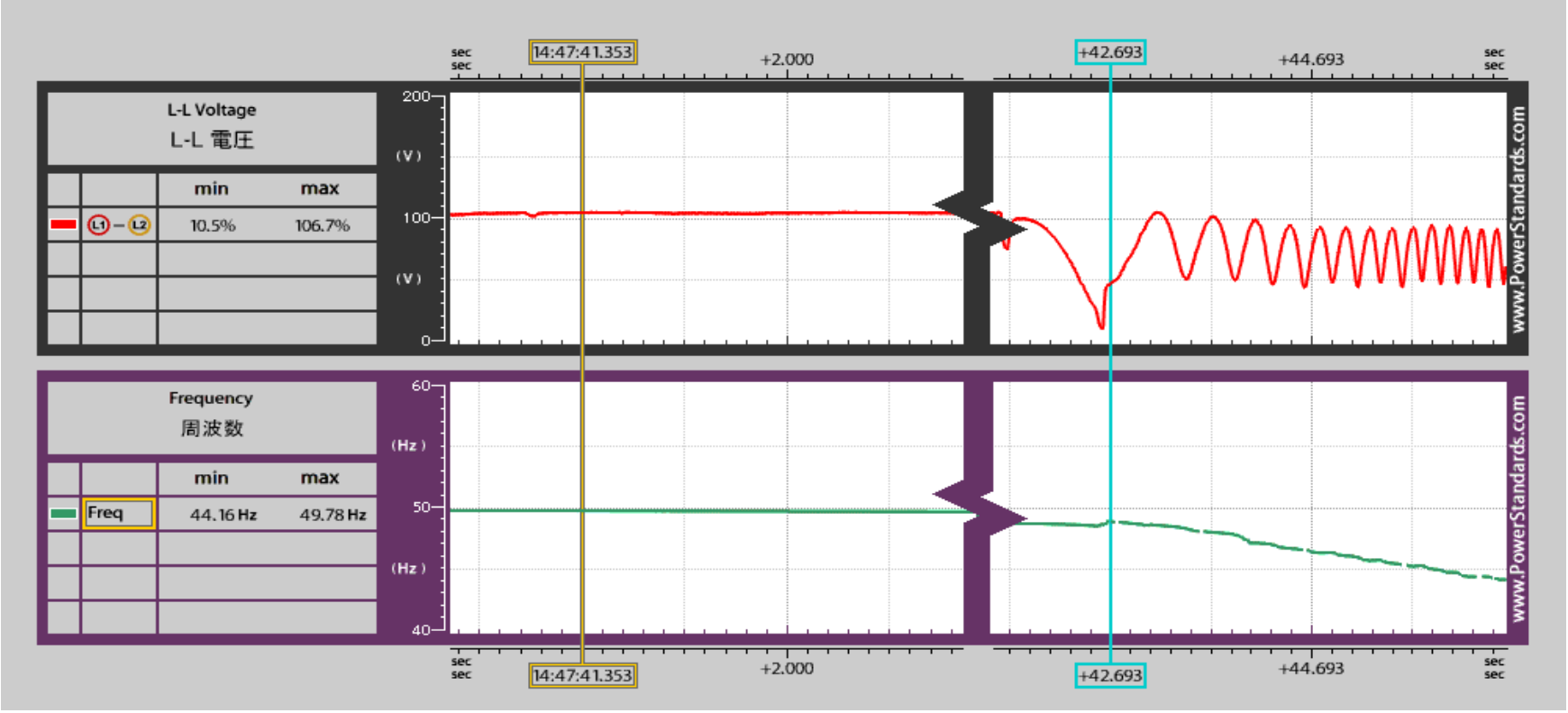
Power Quality in East Japan Area at the Disaster

The data has been collected by NTT-FACILITIES



Under frequency in Sendai (14:47:41, Mar 11th, 2011)

The data has been collected by NTT-FACILITIES

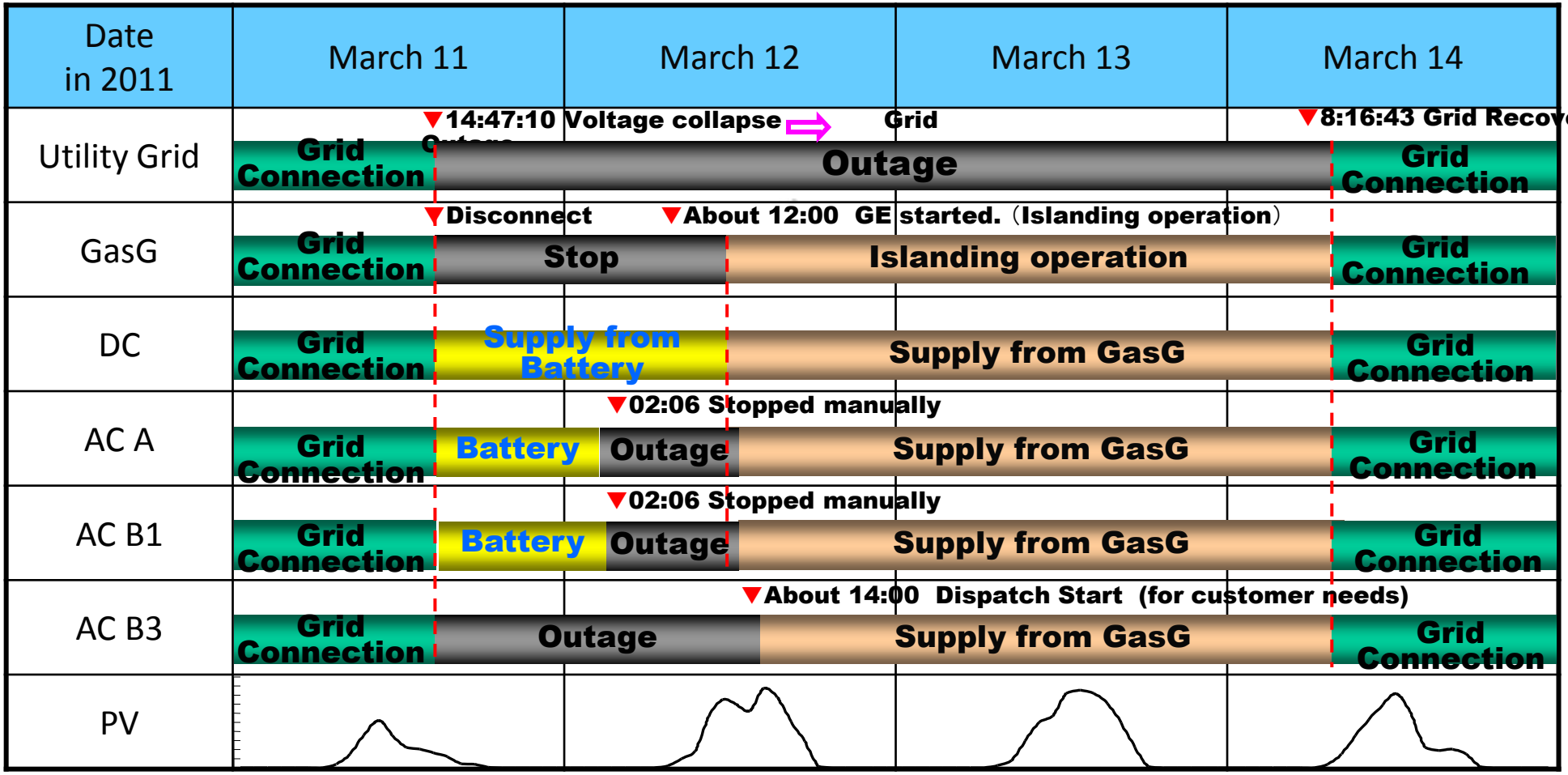


<-50.0 Hz

<-48.4 Hz

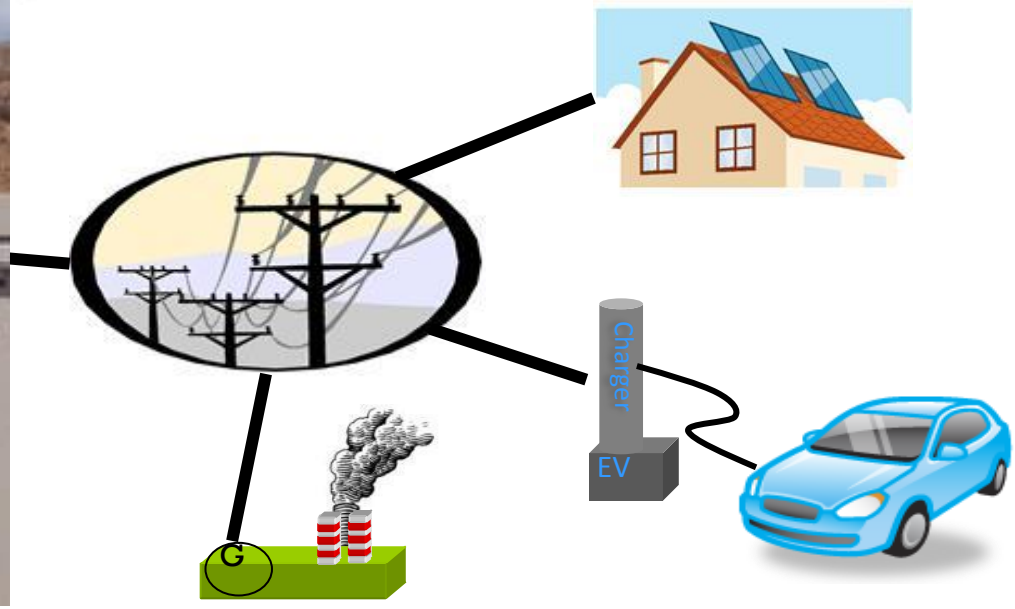
Condition of Supplying Power during March 11

- **MPQM continued to supply DC, A, B1without any interruptions for VRLA batteries and PV generation system.**
- **GasG had supplied power for 43 hours during outage.**

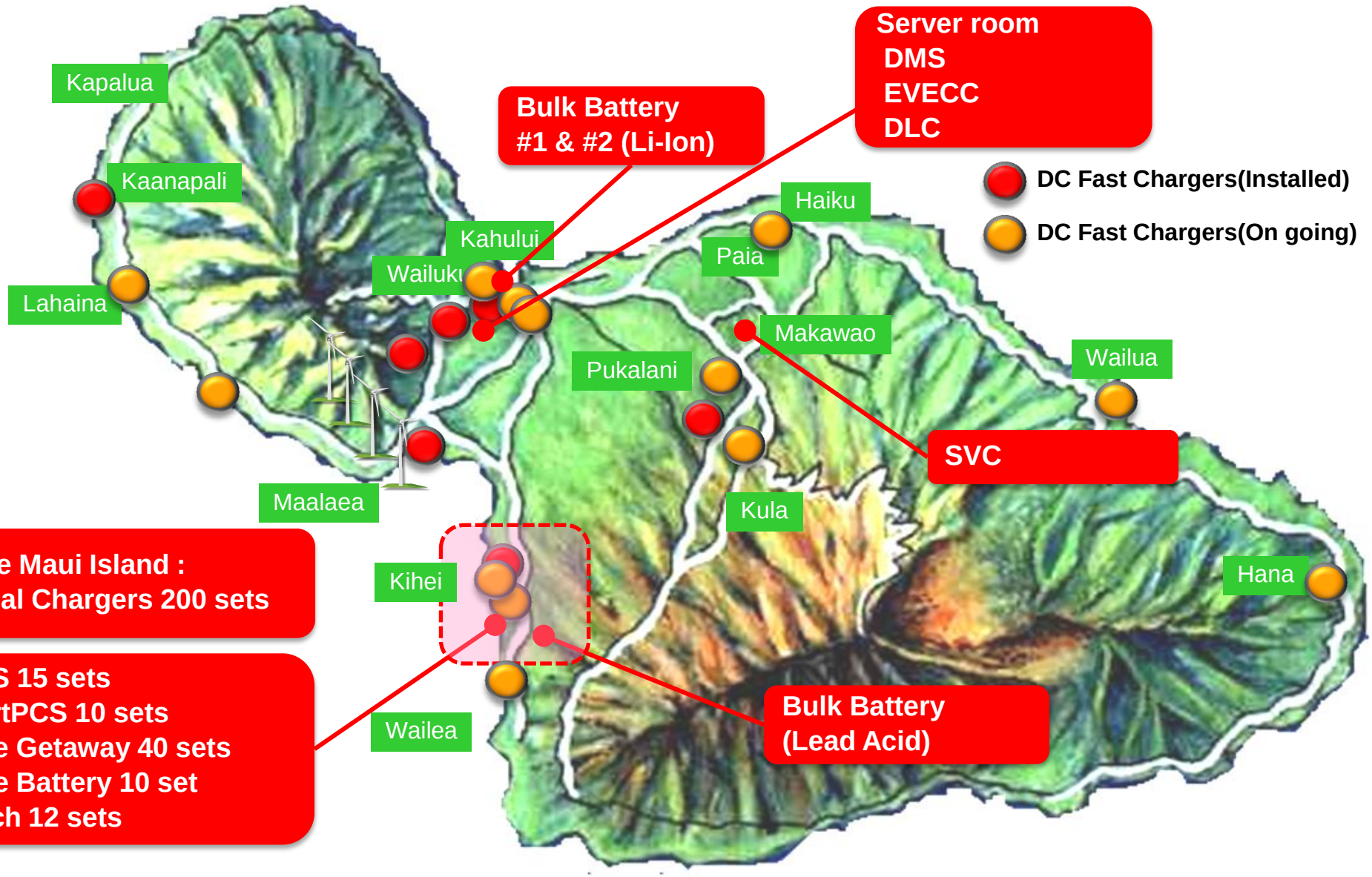


What the project proposes?

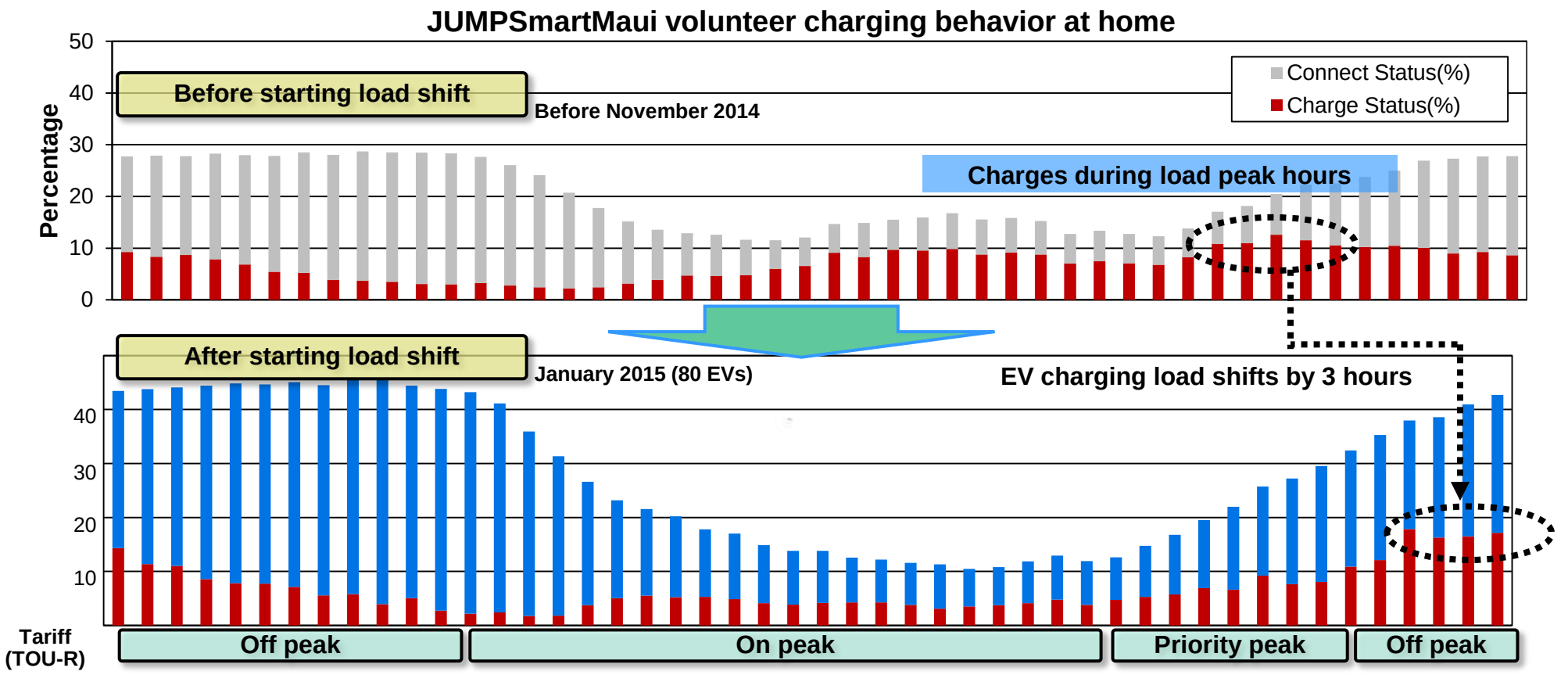
- Renewables (Wind and Solar) friendly EV charging
- Reduce fossil fuel consumption and its dependency
- Mitigate investment cost for absorbing fluctuation by Renewables

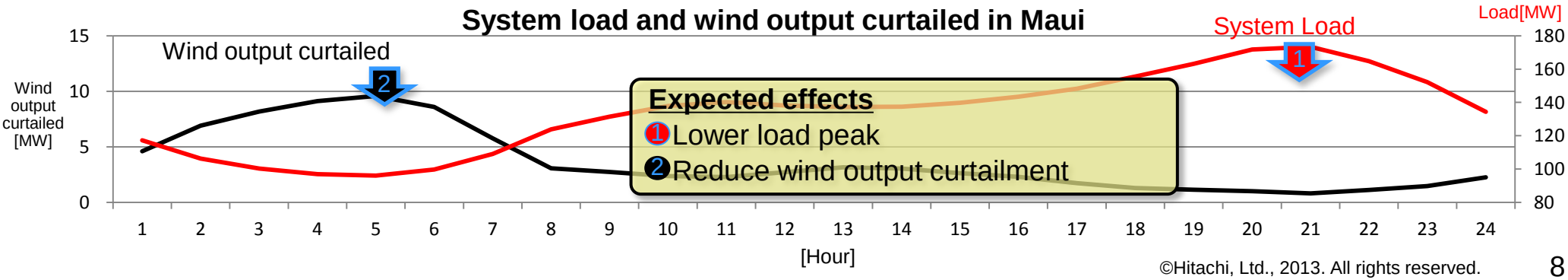


Geographical Locations of Devices in Maui



Data of EV's load shift

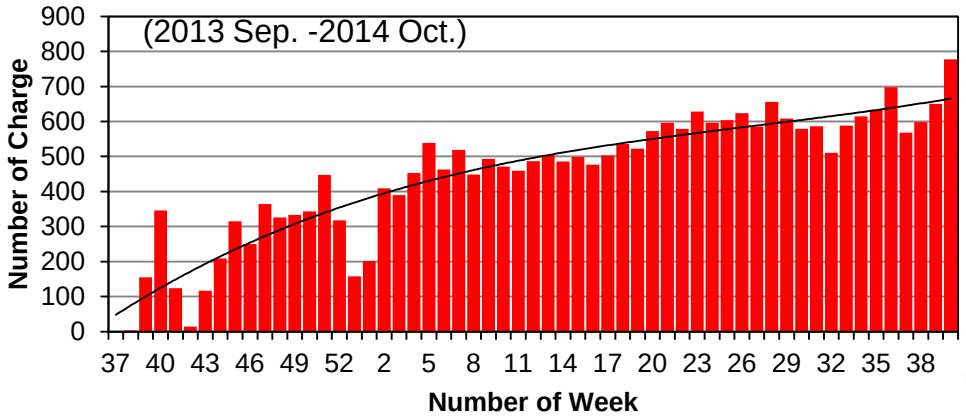




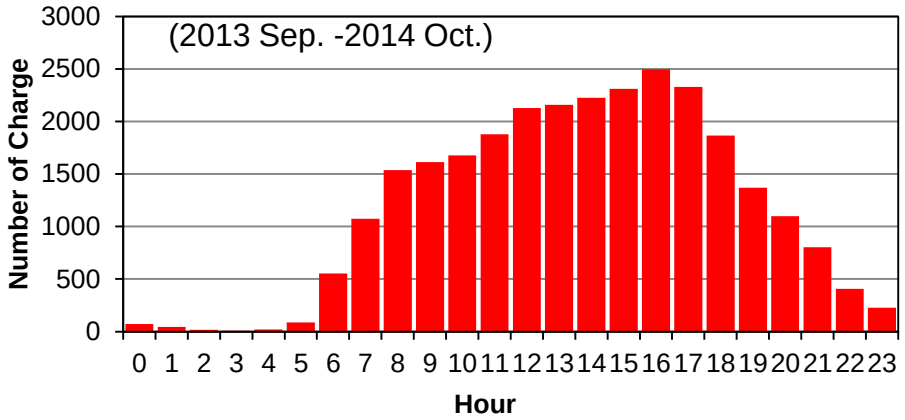
Data of EV DCFC usage

JUMPsmartmaui
SMART ENERGY. SMART CARS. SMART GRID.

The number of utilization has increased from the start of demonstration, and been stable.



DCFCs are utilized from morning to night in people's daily life.



Estimation of CO_2 emissions on gasoline vehicles when they drive same distance with EV

2013 Sep. -2014 Aug.	EV-kwh Charge Usage Consumption at DCFC	Distance (mile) Estimated Drive Distance *1	Gasoline vehicle A		Gasoline vehicle B		Gasoline vehicle C	
			Gasoline consumption (gallon)	CO_2 emission (Kg) *2	Gasoline Consumption (gallon)	CO_2 emission (Kg) *2	Gasoline Consumption (gallon)	CO_2 emission (Kg) *2
Amount	**224,342**	**773,981**	**29,768**	**264,940**	**25,799**	**229,614**	**33,651**	**299,497**

*1 Average electricity consumption of an EV based on usage consumption at DCFC
*2 Amount of CO_2 emission is calculated based on USA (Greenhouse Gas Equivalencies Calculator)
DCFC: Direct Current Fast Charger

Schedule

Operation Starts December 17th, 2013

Project period extended 1 year

2011	2012	2013	2014	2015	2016
F/S	System Design Volunteer Recruitment Equipment Installment		Demonstration Operation Business Case Assessment		

Maui to the World

- JUMPSmartMaui will demonstrate an island-wide EV management system, allowing increased use of renewable energy.
- JUMPSmartMaui will enable Maui to increase renewable energy penetration while minimizing curtailment.
- Results of the demonstration will enable Maui stakeholders to develop policies and practices to achieve long term benefits.
- Our goal is a business model that can be adapted to other islands and other power grids around the world.

Thank you !

http://www.nedo.go.jp/