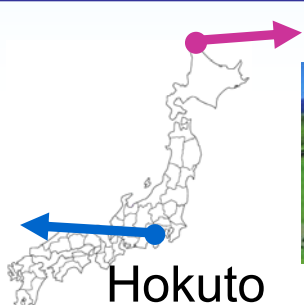


Comparison between Outdoor Performances and Manufacturers' Flash Test Results of Crystalline Si PV Modules



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Overview



Type	Manufacturer	Capacity [kW]
single-crystalline silicon	SHARP	30
	SANYO	30
multi-crystalline silicon	SHARP	30
	KYOCERA	100
	Mitsubishi electric	30
amorphous silicon	SHARP	30
	KANEKA	10
	Mitsubishi Heavy Industries	10
	Fuji Electric Systems	10
spherical	SST	20
compound-semiconductor	Showa Shell Solar	30
	Honda Soltec	3
single-crystalline silicon	MOTECH	10
	KPE	10
	E-TON	10
	Isofoton	30
	GE	30
	Sun Power	50
multi-crystalline silicon	Q-Cells	10
	ErSol	10
	Suntech	30
	BP Solar	10
	Day4Energy	30
	Schott Solar	30
	Systems	SHARP
DAIDO METAL	3	

Different PV technologies have different characteristics, i.e. different temperature coefficient, different spectral response and so on. "HOKUTO Mega-Solar Project" has been conducted by NEDO in Hokuto city, Japan since 2006 for the evaluation of the advanced PV technologies.

Rating of the PV module in Japanese industrial standards allows +/-10% tolerance of nameplate peak power to its actual peak power. Most manufacturers measure each module's output by using flash tester before shipment and confirm whether modules meet the JIS requirement. This paper summarizes single and multi crystalline silicon PV modules' flash test results and their outdoor performances.

Approximately 2MW PV systems are constructed in this project. Because of the availability of the flash test data, twenty four 10kW systems which consist of twelve different module types are chosen for the analysis.

Commissioned by New Energy and Industrial Technology Development Organization (NEDO)

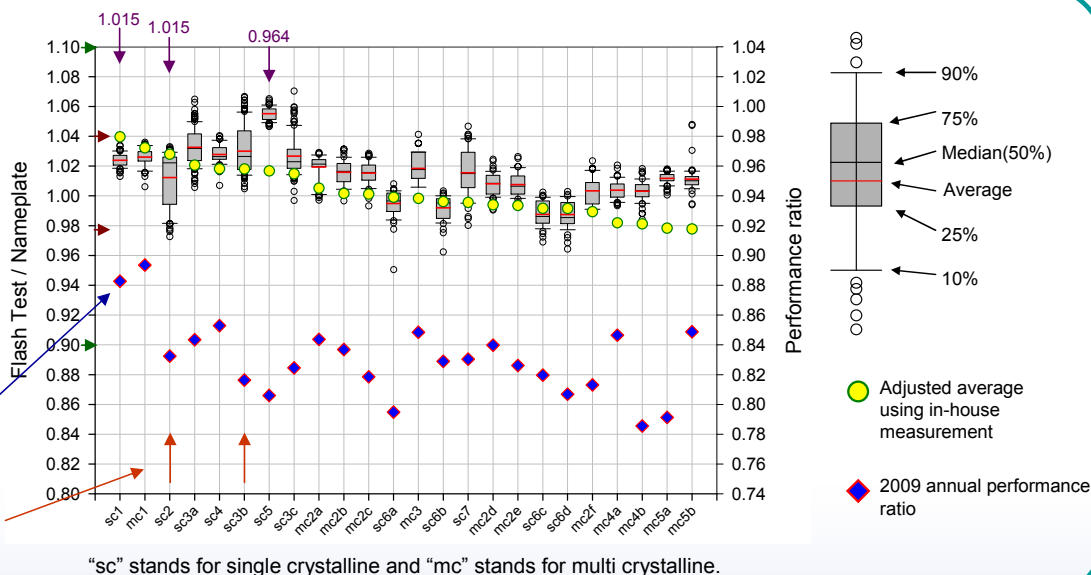


Results

- The STC output of each one sample for twelve types is measured prior to the outdoor exposure in indoor testing facility.
- Adjusted averages are calculated using the following equation.

$$\text{Adjusted average} = \frac{\sum \text{flashtest}}{\sum \text{nameplate}} \cdot \frac{\text{STC}(\text{sample})}{\text{Flashtest}(\text{sample})}$$

- All the modules met the JIS requirement.
- Adjusted averages of the normalized flash test results for each 10kW systems scattered between 1.040 and 0.978.
- Ratios of the STC measurement to flash test result of each samples varied from 1.015 to 0.964.
- The systems with the higher adjusted average showed relatively higher performance ratio.
- Some of the systems with the wider deviation of the flash test values resulted slightly lower performance ratio than others.



"sc" stands for single crystalline and "mc" stands for multi crystalline.

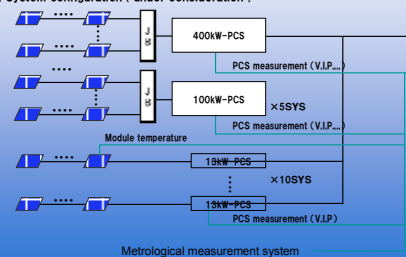
Future plan

The Japan-U.S. Smart Grid Collaborative Demonstration Project

being conducted in the State of New Mexico of the United States.

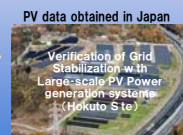
- Evaluation of distributed power systems. Evaluate the performance of PV modules (about ten different types totaling 1 MW capacity will be installed), and compare with other performance evaluation results obtained in Japan.

System configuration (under consideration)



PV modules (under consideration)

No.	Type	Manufacturer
1	single-crystalline silicon	SHARP
2	single-crystalline silicon (HIT)	SANYO
3	single-crystalline silicon	Sun Power
4	multi-crystalline silicon	KYOCERA
5	multi-crystalline silicon	SHARP
6	amorphous silicon (single)	KANEKA
7	amorphous silicon (tandem)	KANEKA
8	CIGS	Honda Soltec
9	CIS	SOLAR FRONTIER
10	CdTe	First Solar



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