In Japan, mega-solar systems were introduced in large quantities in a few years after the start of the Feed-in Tariff law. Since purchase rate of generated electricity has been decreasing year by year, in near the future, expansion of mega solar operation & maintenance management market is expected from the viewpoint of securing the amount of generated electricity. The sophisticated verification (SV) method is a method of separating and quantifying the power generation loss by using the measured data at 1 minute data and basic informations of the system (latitude, longitude, inclination angle, etc.) By analyzing the data for one month, it is possible to analyze the cause of performance changes and analyze degradation by separating shadows, snow cover, reflections, temperature, DC circuit, PCS and other losses. And this method is expected to apply mega solar operation and management. Snow covering is a cause of decline in mega-solar output, but quantification of loss due to snow has not been done so far. In previous method, fluctuation loss and operating point mismatch (high voltage side) loss under the snow cover included snow cover loss. In proposed method, this loss is classified as snow cover loss.

Snow cover loss is defined as the cause of the decrease in the output of the system due to snow on the PV module. PCS off, PCS capacity shortage, output curtailment, fluctuating data are firstly separated into each loss, and snow loss is separated. The snow cover judgments use the operating point of current and voltage estimated from irradiation amount and module temperature. The operating point of voltage or current where the air temperature is lower than 6 degree Celsius and not more than the threshold from the maximum power voltage and the maximum power current are judged as snow cover. In this paper, data corresponding to the fluctuation loss is judged by snow judgement condition, and the loss that meets the condition is integrated as the snow cover loss. On the other hand, the operating point mismatch (high voltage side) loss is determined only by snow accumulation judgment based on the operating point of the current, because the voltage is larger than the maximum power voltage, and the corresponding loss was integrated into the snow cover loss.

Figures show the analysis results of the next day after snowing. Where, “standard output” is the maximum power expected under the standard test conditions for the measured solar radiation, “array output” is the actual power generation, and Loss is the power loss caused by subtracting the array output from the standard output. Figure 2 shows the results before applying the proposed method, there are many solar irradiation fluctuations. Since this loss is caused by snow cover regardless of fluctuation, it was integrated as a snow cover loss. Figure 3 shows the analysis results of the proposed method, which shows the snow cover loss was clearly separated as compared with the conventional results (Figure 2).

Thus, it is possible to make the SV method useful for PV maintenance, such as determining whether to remove snow covering.