

## Summary

This paper evaluates the cost reduction potential of Photovoltaic (PV) systems which is now widely spreading and is expected to achieve further cost-reduction for the sake of larger-scale installation. In the previous paper, we analyzed the cost structure of various solar cell systems using quantitative technology scenarios and proposed a PV technology roadmap to achieve 5 yen/kWh power generation costs by 2030.

In this proposal, we proposed required technologies to reduce the PV system cost as a result of our analysis using the quantitative technique scenarios. We evaluate present and future technology scenarios of compound PV systems (based on CIGS and III-V semiconductor materials) considering achieving time of research and development. To analyze future PV technology costs, we designed manufacturing process of different types of compound semiconductor solar cells, such as monolayer and multi-junction types including 4-terminal type. According to our cost-structure analysis, monolayer CIGS PV system cost will decrease from 125 yen/W to 97 yen/W by 2020. The installation cost of new CIGS tandem solar systems is calculated to be 50-70 yen/W with more than 30% module efficiency after 2030. These results show an importance of comparison among different designed solar cells in estimation of future cost-structure and technology development. To achieve more than 30% module efficiency, it is important to control defects and interface of cell layers, crystallization and formation technology. Although III-V solar cells have achieved high efficiency, manufacturing cost needs to be decreased with more than ten times higher productivity. Concentrating PV system also needs drastic improvement.

We also compare the PV installation costs with a technological level in 2009, 2012, and 2015, respectively. PV installation cost in 2009 decrease from 253 yen/W to 125 yen/W by using technological level in 2015. It was confirmed that this type of cost reduction involves price reduction of raw materials and production equipment based on market expansion and improvement in module efficiency and productivity. It is important to continue cost evaluation analysis at intervals of one or two years with the consideration of technology development and market expansion.