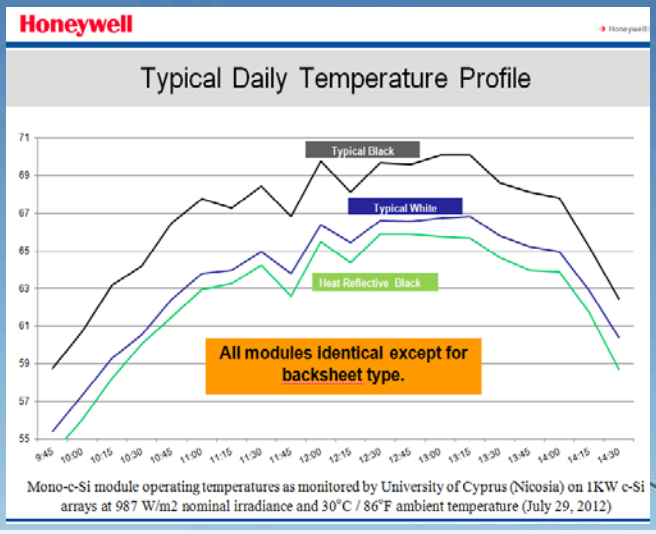
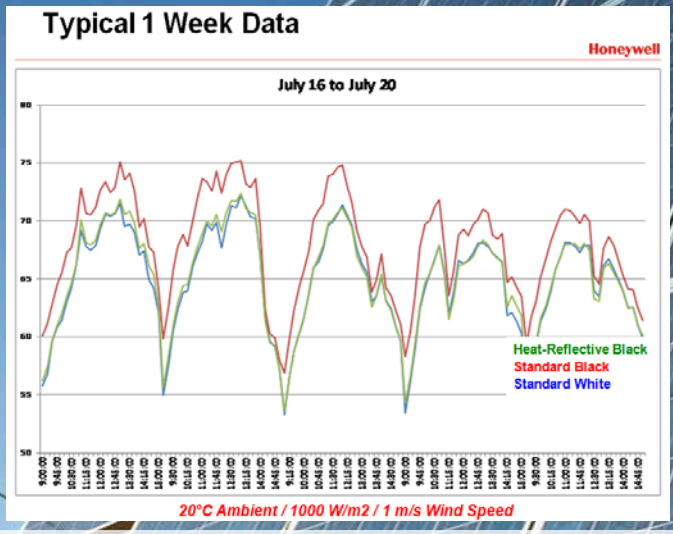
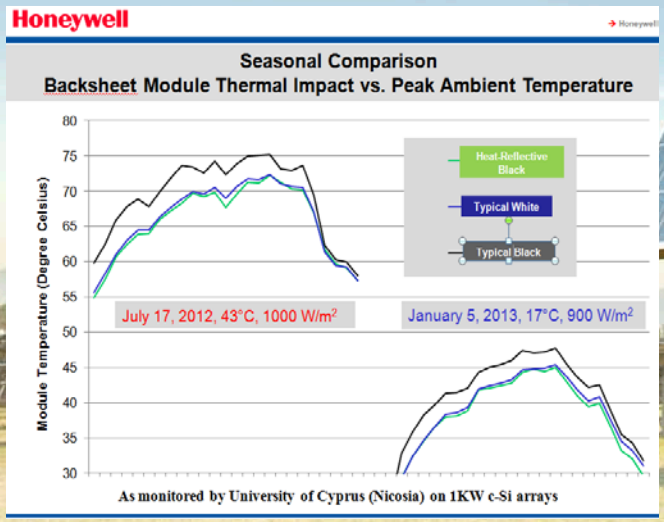
Reducing c-Si Module Operating Temperature via PV Packaging Components

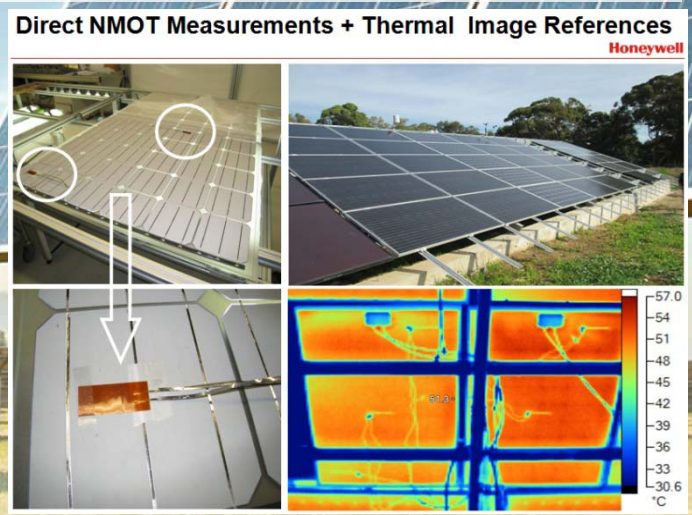
Purpose of Work: In theory, reducing average module operating temperatures should reduce the long term rate of degradation of module components, especially for polymer based materials, and lead to improved module reliability. As opposed to the recent common practice of "cost out among most PV module producers, another approach is suggested where small changes in packaging materials could lower c Si module operating temperatures by 2 to 10 degrees Centigrade. One such example is presented and potentially has additional benefits.





Typical daily and weekly comparisons of 3 independent grid-connected module arrays illustrating that the backsheet employed can impact NMOT. Note that the module with the "heat-reflective" black backsheet displays average operating temperatures closer to those of a typical white module.





Modules with heat-reflective backsheets still maintain lower NMOT despite seasonal variations in ambient temperatures.

Data via embedded probes cross-referenced to IR images confirms lower temperature of modules equipped with heat-reflective backsheets.

Conclusion: Module packaging can influence NMOT. Lower NMOT's theoretically should improve module reliability. In BIPV / BAPV applications, where dark modules are often used, lower NMOT's can theoretically also result in higher system power and reduced impact on building envelope.

Honeywell