Table 10.10 EOL specific weight (W/Kg) at the CIC and panel levels for three-mil high-efficiency Si, dual-junction (2J), and triple-junction (3J) cells [52]

Solar cell technology	CIC specific power [W/kg]	Panel specific power [W/kg]	Normalized (to HE Si) panel cost [$/W]
GEO conditions (60°C) – 1-MeV, 5E14 e/cm^2			
75 μm H.E. Si	261	75	1.00
2J III-V	219	95	0.9
3J III-V	248	108	0.8
LEO conditions (80°C) – 1-MeV, 1E15 e/cm^2			
75 μm H.E. Si	221	63	1.00
2J III-V	199	86	0.84
3J III-V	223	97	0.75

cells are less radiation-hard and have lower specific power (W/Kg) than 75-μm Si cells, but they cost about 35% less.

Currently conventional space Si cells are less expensive than MJ cells at the panel level. However, their EOL power is much lower than either the high-efficiency Si cells or the MJ cells. The increased mass and area that their usage entails would have to be considered against the cost savings and other mission considerations in any comparative study.

Engineers have worked on ways to improve space solar cells and arrays in terms of all the important figures of merit since the early days of our space program. Numerous mission studies have shown that even extremely high array costs can be worth the investment when they result in lower array mass. In general, mass saving in the power system can often be used by payload. If the revenue generated by this payload (i.e. more transmitters on a communications satellite) is greater than the cost of higher-efficiency solar cells, the choice is rather an easy one to make. However, often more instrument capabilities will require more support from the spacecraft (e.g. command and data handling, structure, attitude control, etc.) as well as more power. These additions can negate any apparent advantage to the overall spacecraft.

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