can range from three to five years for batteries, and from 5 to 10 years for electronic inverters, converters, and controllers. The key to the long life of the full system is therefore ongoing maintenance and repair by a qualified supplier.

Operations and maintenance cost: Whereas photovoltaics have a reputation of being "maintenance free," this only applies to the PV modules. PV systems actually require regular checking and maintenance like any electrical system. Financing should be contingent on there being a plan and/or contract for ongoing maintenance service by the installer or another qualified electrical contractor.

Residual value: The residual value of a PV system is the amount that it can be sold for ("liquidated") at the end of the loan or lease. A lender wants assurance that the system's value is never less than the outstanding balance on the loan. A leasing company needs assurance of good residual value, since this is what the leasing company will own at the end of the lease. Lack of evidence on the collateral/residual value of PV equipment is one of the weak points in PV financing today.

Tax treatment: A key issue for financing is how photovoltaics is treated for tax purposes. This typically includes sales and property tax abatements, income tax deductions and credits, and accelerated depreciation schedules. These factors can be instrumental in determining the economic viability of a PV system and the timing of cash returns to the owner.

Regulatory treatment: A factor that is increasingly important is how photovoltaics is treated in government regulations. A key regulatory issue for grid-connected applications is whether photovoltaics qualifies for net metering. That is, whether electricity generated by the PV system can be applied to offset retail electricity purchases from the utility. If photovoltaics qualifies for net metering, then the value of the PV's output electricity equals the retail rate, typically 8 to 15 ¢/kWh in Europe and the United States, and over 20 ¢/kWh in Japan. If photovoltaics do not qualify for net metering, then the electricity is only worth the wholesale "avoided cost" rate, which is typically 2 to 5 ¢ per kWh. As of the year 2002, over 30 US states and several countries like Germany and the Netherlands, have adopted net metering or equivalent regulatory treatment.

Economics of the application: The previous factors related to the PV system. But what really separates photovoltaics from other power-generation technologies is the degree to which photovoltaics becomes an essential element of an end-use application – such as providing "essential electricity" for remote telecommunications, water pumping, home lighting, and other off-grid applications, or providing "clean electricity" for homes, commercial buildings, and other on-grid applications. A key question for the financier is whether the end-use application is economically viable, and the degree to which the use of photovoltaics makes it more or less so. Please see Section 24.4 for additional discussions on PV economics.

Codes and standards: Financing should be conditional on a PV system meeting all applicable codes and standards, and this will vary by end-use application, whether the PV system is integrated into the structure of a building, on the roof of a residential home, or in a field serving a remote application. The key US national standards include the National Electric Code and special standards for interconnection to the utility grid that have been promulgated by the Institute of Electrical and Electronic Engineers (IEEE) and Underwriters Laboratories (U/L). There is also a need to meet all applicable local building and electrical codes, which vary by locality (see Reference [8]). European