

Small RE Systems: Performance Versus Prediction

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Wind turbines and photovoltaic systems have the potential to off-set energy costs at remediation sites while providing good opportunities for offsetting power plant emissions and attracting positive public interest. These small renewable energy systems will almost always “work”, but the big question is how much energy will be generated? The models that are used to predict wind turbine performance and solar panel output are straight-forward, but the reliability of the performance predictions are sensitive to the earth resource data that are used as input. Data sources include publicly-available resource maps, publicly-available databases, and site-specific data collected for individual applications. Thus the engineer may be able to generate more than one performance prediction for any given system. The performance predictions are further complicated by the inherent random variability of wind velocities and solar irradiation. Three case studies are discussed: a 10 kW-rated wind turbine at the former Nebraska Ordnance Plant Superfund Site, a 2.16 kW photovoltaic system installed at a state-owned facility in Rolla, Missouri, and a renewable energy feasibility study for the small village called Sacala las Lomas in the rural highlands of Guatemala.