Challenges and Opportunities

Agencies (DOE's SunShot program, Advanced Manufacturing Office, NIST) and regulators (EPA, California Department of Toxic Substances) are all potential clients and manufacturers (equipment, PSEL also possesses basic prototype module fabrication equipment; a small vacuum laminator and a string tabber. Staff at PSEL have many years of manufacturing and supply chain expertise. It will incorporate principles of design for recyclability for module and systems. Module and component manufacturers, federal, state and local governments and state and local regulators are also potential clients. End-of-life management will be included in TEA analyses of PV LCOE. The US will need technology and policy solutions soon to address what could become a serious environmental weakness for PV if waste PV modules could constitute more than 10% of e-waste globally by 2030 (Figure). Given the historical and anticipated growth in PV module deployment, US deployment eventually leads to increasing end-of-life module waste, analogous to other consumer electronic waste (e-waste). The best available projections suggest that waste modules may constitute more than 35% of a market value by 2030. However, the historical and anticipated growth in PV module deployment, US recycling rates are very low compared to other electronic products, such as secondary solar panel (SSP) recycling. Currently, there are few recycling solutions offered in the US, partly because there are no market drivers or mandates. A 2012 European Union Directive added PV modules to the list of electronic products requiring the collection and recycling of disassembled used-EU products by the manufacturer selling into the EU market. All materials salvaged from a given module are substantially the same, regardless of how the module was manufactured. There are many commercial “take-back” programs for PV modules, and many companies are developing other modular. For Duramat, these capabilities will be applied to the investigation of defects/failures within PV modules. Candidate inspection techniques will be identified and evaluated through the DuraMat Consortium to complement and validate indoor and outdoor accelerated testing. Aged material coupons will be provided to consortium members that are performance and efficiency comparable to commercial-grade materials. Lifetime performance data will be collected and used to build a predictive model of module performance. Link to Your Website http://energy.sandia.gov/renewable-energy/solar-