

Development of an Industrially Relevant RE-SOLAR Design Framework – University of Pittsburgh, University of California, Irvine, First Solar, National Renewable Energy Laboratory

Node Alignment: Design for Re-X

Project Type: Exploratory

- The major technical/economic barriers facing Re-Solar design are that (1) current solar industry design practices give little or no consideration to environmental or total cost of ownership issues associated with processing, manufacturing, assembly, use, and end-of-life and (2) do not address techno-economic considerations required to evaluate Re-X design tradeoffs, risks, or potential business implications associated with the entire lifecycle of use and end-of-life.
- This is an imminent and critical challenge as previously installed solar modules are now creating a surge of electronic waste (e-waste). The installation of new systems is also rapidly being scaled up and may create tremendous amounts of e-waste at the end of their lifespan. Recoverable waste from US solar modules was estimated to be cumulatively \$3 to \$19M in 2016 and projected to be worth 450 M by 2030 & \$15B by 2050.
- REMADE Technical Performance Metrics (TPMs) Being Addressed:
 - Develop technologies capable of achieving 25% improvement in embodied energy eff. in 5 years.
- Technology/Knowledge Gaps Being Addressed:
 - Current design approaches of solar systems suffer from knowledge gaps in (1) the life cycle impact of different solar materials & manufacturing choices; (2) the economics of various potential disposal, recycling & recovery scenarios; and (3) the integration of LCA with power conversion efficiency simulations and techno-economic analysis for understanding tradeoffs and making design decisions.