

# PV Recycling and Recovery

Solar Energy Industry Association

# Current Deployment

- 300+ MM Panels Deployed
- 25 – 30 Year Life Expectancy (Some 40 years+)
- 80% of all panels deployed in the last 7 years

# Regulatory

- Some panels may be considered hazardous under TCLP rule (most are not)
- Manufacturers use significantly less metals (silver/lead) in panel construction
- US EPA currently considering Universal Waste Designation
- California currently the only State applying Universal Waste Rule
- California, Washington, and Niagara County have implemented requirements for recycling

# Two Economic Models

- High Value
  - Copper, Silver, Steel, Aluminum
  - Processing yield far exceeds cost of recovery
  - Generator of the material (waste) gets paid by processor

# Two Economic Models

- Low Value
  - Electronic Displays, Mixed Plastics, Glass, PV Panels, Tires
  - Cost of recovery far exceeds processing yield
  - Recycling services at a cost to waste generator

# PV Panels = Low Value

- Extensive Processing Requirements
- Low Quantities of Recoverable Value – Copper, Aluminum, Silver
- High Quantity of Low Value Commodity – Glass

Current

PV

Recycling

Processes

# Typical PV Processing Line

# Challenge

- **GLASS**
  - Represents 80% of the panel by weight
  - Moving glass is expensive
  - Need regional markets
  - Work needs to be done to find re-use opportunities

# Before Recycling – Refurbish/Re-Sale

- Refurbish/Re-sale is a fast-growing segment in the US
- Companies providing revenue share opportunities
- Could reduce decommissioning cost
- Concern: Improperly handled end of life panels in international markets

# What is SEIA doing?

- Conduct Due Diligence of Recycling Partner Facilities
  - Physical Site Audit
  - Regulatory Compliance Review
  - Confirm Adequate Insurance Coverage (Pollution Liability)
  - Mass Balance Review
  - “Sham Recycling” exists
- Policy Development and Support
  - New York
  - California
  - Washington

# SEIA Recycling Partner Program

- Ten (10) Recyclers/Refurbishers in the US
- ANSI Standards Development
- Recycler certification
- Partners in Arizona and Texas (Nevada soon)
- 10MM panels annual capacity
- First Solar offers take-back program for thin film panels

# SEIA National Policy Framework

- Utility-scale – decommissioning plan satisfies EOL requirement
  - Require recycling or reuse as part of decommissioning
- Third-party owned/leased solar – decommissioning agreement in lease/PPA satisfies EOL requirement
  - Require reuse or recycling as part of decommissioning
- Customer owned solar – acknowledge responsibility is on the owner at end of life and can be paid at drop-off site or included in maintenance service contract
  - To extent possible, use existing recycling resources and infrastructure
  - Industry should work to develop a network of third-party collectors who will accept the products for recycling (can also be used by TPO solar providers)
- Industry / state should jointly develop resources showing where PV modules can be brought for recycling and approximate costs (e.g. website; maps; cost info; contact info for facilities)
- Any recycling requirements should be forward-looking, phased in, and account for existing contractual arrangements and industry practices
- States should collect data on PV EOL and develop in-state recycling capacity