# *Welcome!*

"A Presentation:  Solar Panel Recycling"

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Echo Environmental

New Jersey Department of Environmental Protection

# Agenda

- Solar 101: Panel Types
- Construction of Crystalline panels
- Construction of Thin Film panels
- A Solar panel recycling process
- Sustainable products from pv recovery
- Why is this important?
- The benefits of reuse
- Q&A

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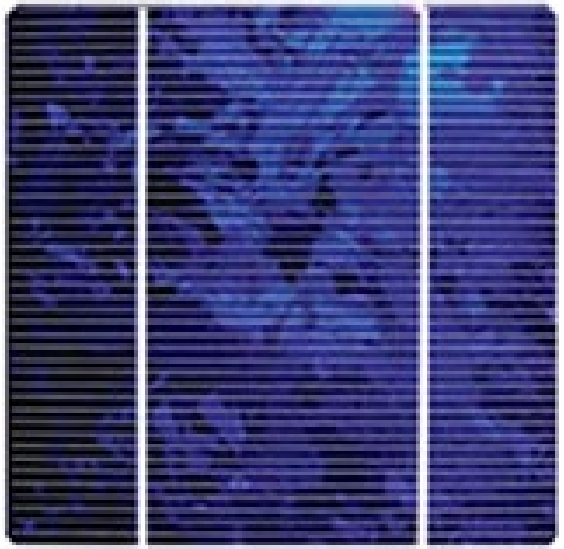
# Solar 101

Mono



Poly

Thin Film

## Panel Types

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# *Mono-Crystalline and Poly-Crystalline Solar Panels*

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# *The Basic Construction of a Crystalline Solar Panel*

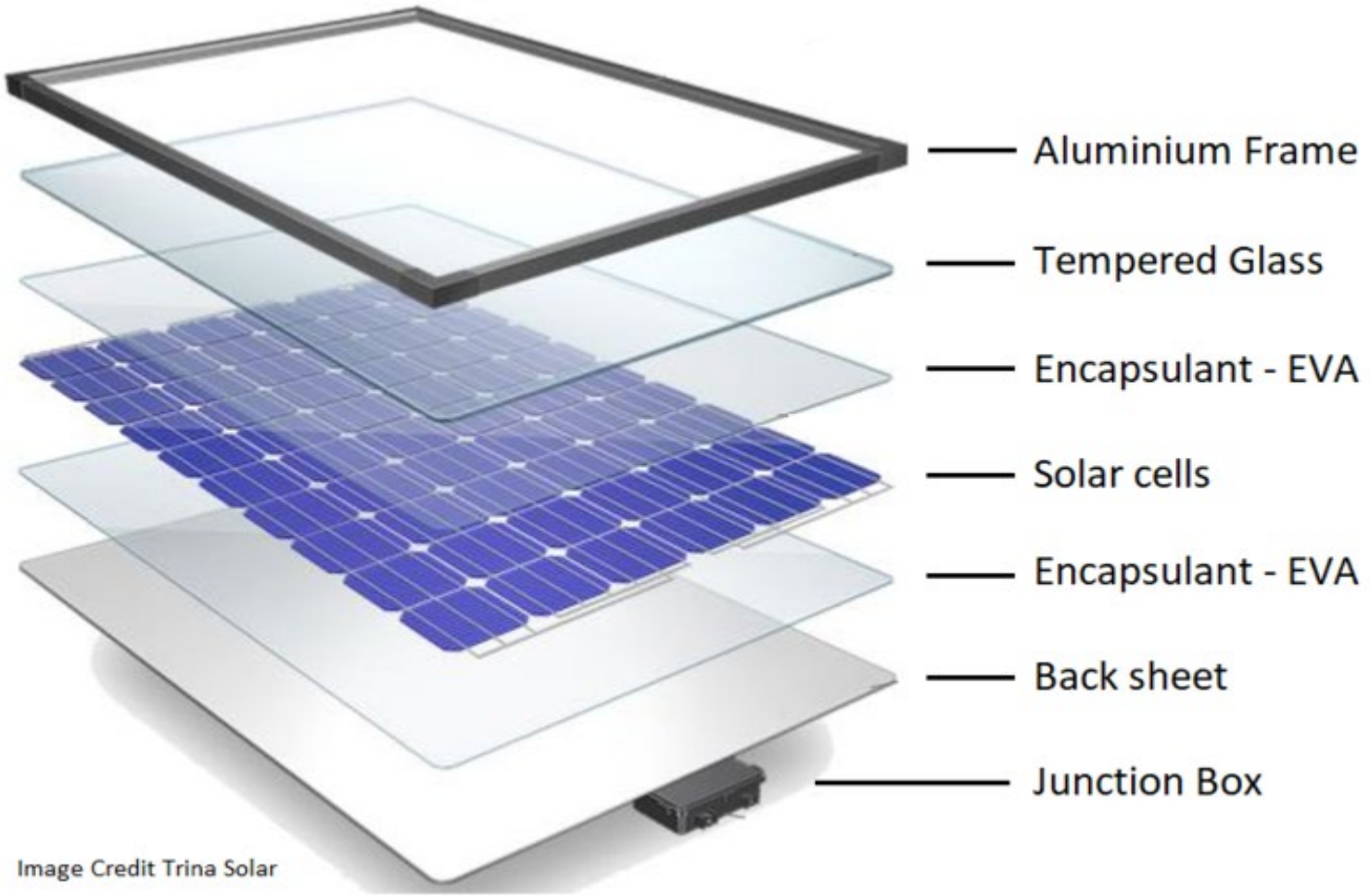


Image Credit Trina Solar

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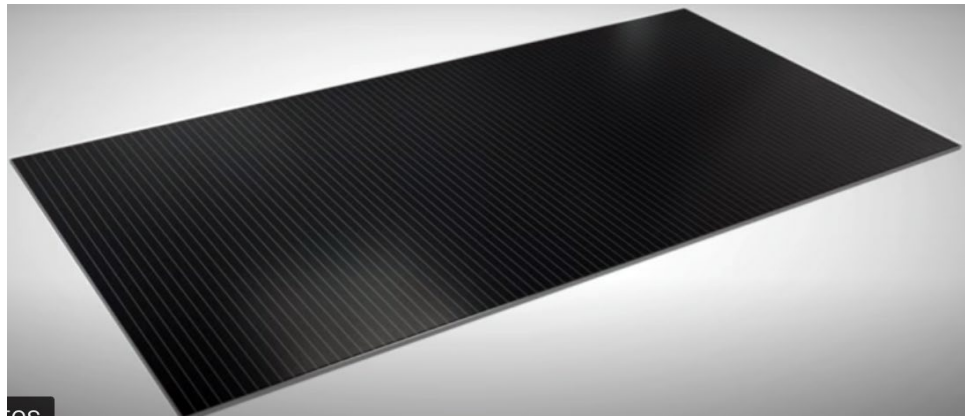
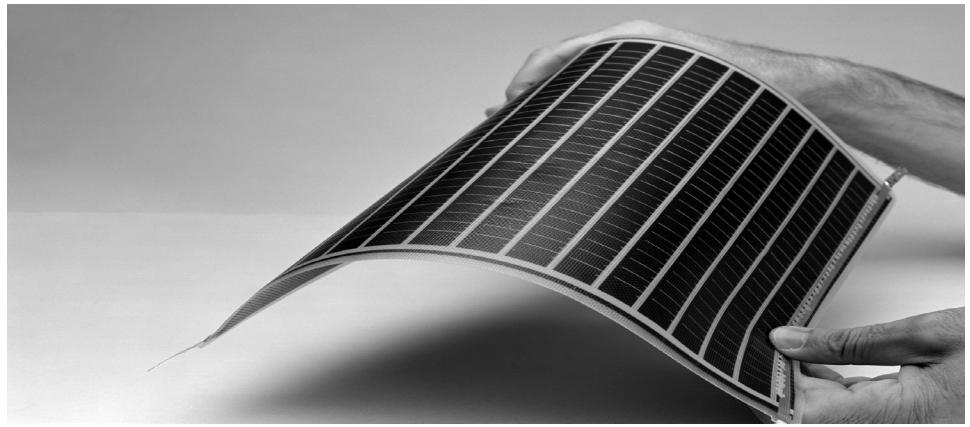
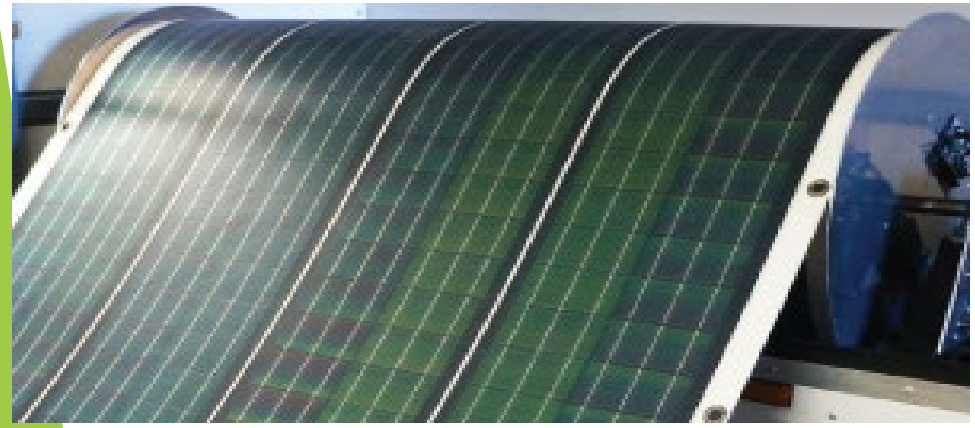
# Thin Film Solar Panels



*Cadmium/Telluride Solar Panels*



*Amorphous Silicon Solar Panels*



*CIGS Solar Panels*
*Copper, Indium, Gallium, & Sellenide*

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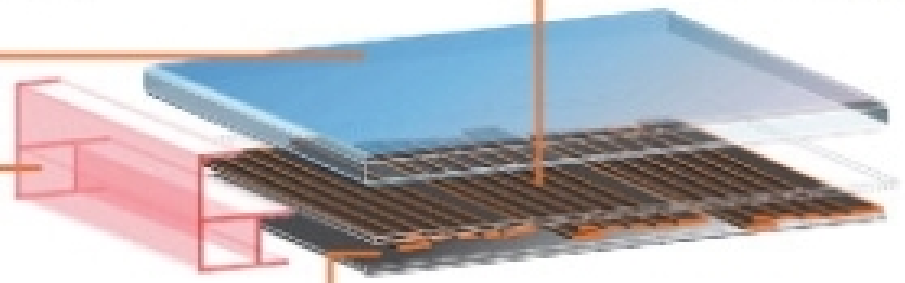
# *The Basic Construction of a Thin Film Solar Panel*

**Surface**

- Different sizes
- Production today max. 2125 x 1200 cm
- For prototypes up to 4420 x 2200 cm
- Different glass-types (e.g. coating)
- Different glass thickness and colors
- Flexible material (bendable, light weight)

**SuperCell**

- Different sizes (2x20 cm ->120x50 cm)
- Different performances (U,
- Flexible material (bendable, light weight)
- Flexible interconnection



**Frame**

- Multiple options (size, material, color)
- Frameless

**Backside**

- Different sizes
- Different glass types and thickness
- Different material (glass, alloys, foil etc.)
- Flexible material (bendable, light weight)

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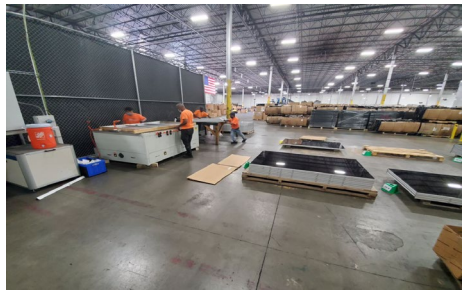
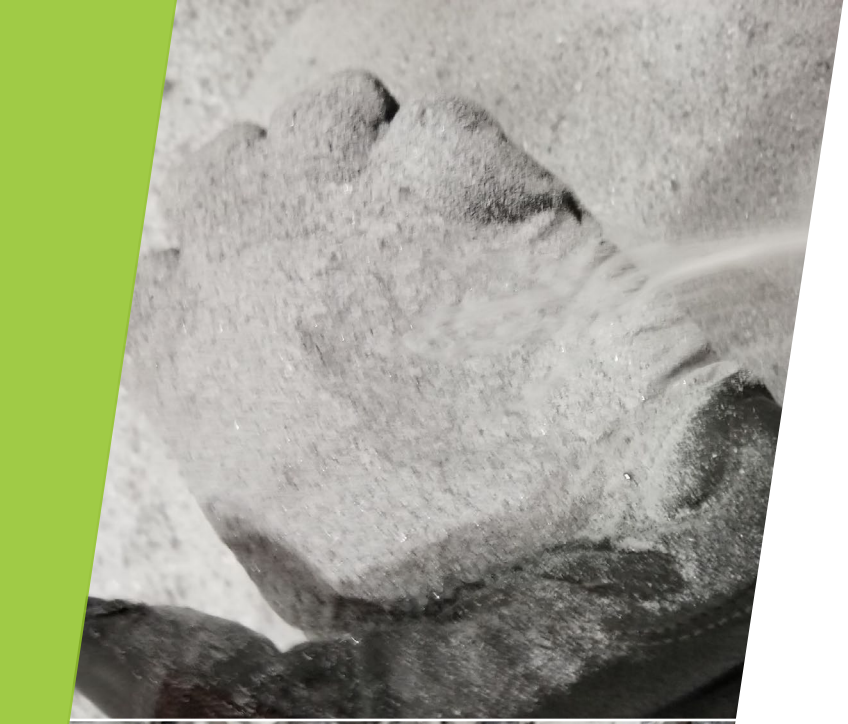
# The Recycling Process



1. Removal of aluminum Frame, Junction box, and wires
2. Remaining PV is shredded for size reduction and milled for glass separation
3. Glass and Aluminum is then sent to various downstream customers for use in sustainable products
4. "Fluff" is blended with our low-grade circuit boards from our electronics recycling operation and sent to our Smelter for the recovery of silica and metals.

**Industry wide challenge:** Separating backsheet, silicon, and metals to achieve the pure state required for full sustainability.

# Sustainable Products from PV Recovery



# *The Process Goal*

- 100% RECYCLING
  - **Maximize** Residual Value through economic process
  - **Minimize** Risk to the environment by keeping product out of the landfill
  - **Create** product downstream
    - (ie. Aluminum, Glass, Polyvinyl Fluoride, Silicon, and Refining Material)

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# Why is this important?

- 35.3 million panels may reach the end of their lifespans, not counting the hundreds of millions of panels that flooded the U.S. market in the last decade that may need to be disposed of sooner. – Solar Power World Article

- Today, about 90% of solar panels end up in landfills, where, like all e-waste, they eventually leach toxic chemicals into the ground and water supply. (1)

- In fact, by 2050, waste from solar panels could account for 10% of the total electronic waste in the world. (2)

- One study showed that cadmium telluride solar panels leached as much as 62% of their cadmium into the water after only one year. (3)

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# The benefits of Solar reuse!

- Over the next 30 years, recycled solar panel parts could have an estimated 15 billion dollar value and may be able to produce as much as 630 GW of electricity if used in new modules. (1)

- Maintaining green energy should continue to be a positive for the protection of our environment

- Refurbishment offers the ability to expand a sustainable, solar power presence in developing countries.

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# Thank you!

## Any Questions?

**For future questions please contact :**

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