



recyclepv solar

# PV in the Circular Economy

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[www.recyclePVsolar.com](http://www.recyclePVsolar.com)

# Early Solar Pioneers

**Ron Kenedi**

**Sam Vanderhoof**

1979, North San Juan, CA

Independent Power Company



"Our mission is to keep solar PV materials out of landfills  
and to reclaim all components."



- We opened our solar recycling/processing plant in 2018.
- Today, we are currently collecting solar panels from around the USA and we process them in Tucson Arizona.
- We are the ONLY company in the USA that solely focuses on solar recycling.
- Our goal is to continue to develop policies, technologies, partnerships and infrastructure to support the responsible and environmental issues surrounding solar PV systems.

# The Problem!

- ✓ Rapid increase in End of Life (EOL) Solar Panels
- ✓ No comprehensive solar recycling infrastructure in the USA
- ✓ Few government programs supporting EOL solar
- ✓ **Europe** recycles 95% of all solar
- ✓ **USA** landfills 90% of all solar

Ever 90 seconds, a solar system is installed in the USA







**•140,000 solar panels are installed everyday in the USA .....or, 7 million pounds of solar panels daily.**



A yellow freight train is shown from a high-angle perspective, curving through a dry, desert-like landscape. The train is pulling several intermodal containers in various colors like blue, red, and orange. The text is overlaid on the top half of the image.

**7 million pounds of solar panels is equal to 164 freight train cars filled with solar panels being installed every day in the USA**

How many miles long would the train be if it were filled with all of the current installed solar panels in the USA?





# Current Situation

**11GW installed in the US in 2018**

**Brought the cumulative installed total to 63GW**

**That is 4.7 million tons of modules alone!**

**It's thought that solar would last for over 25 years.**



# Do Solar Panels Last 25 Years?

**Not always,**

**Manufacturing defects before install**

**Breakages in transit or installation**

**Recalls due to performance**

**Damage due to severe weather**

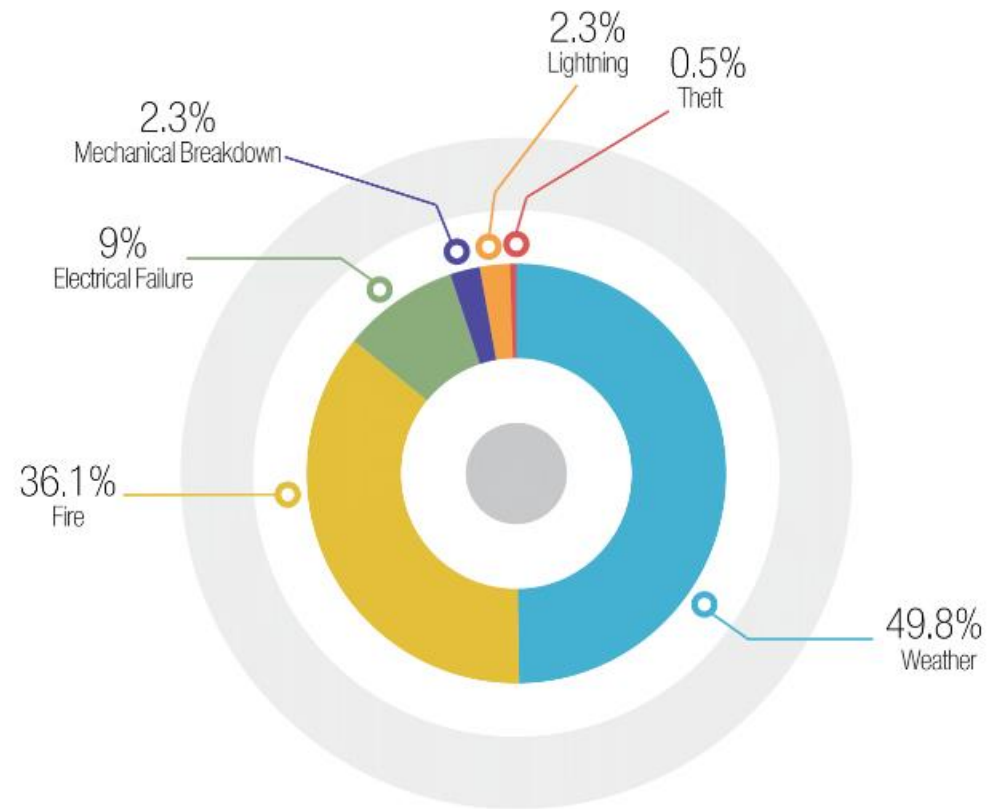
**Repowering**

**Decommissioning**



# ROOT CAUSES OF SOLAR PV CLAIMS

## NORTH AMERICA





- **Where will these panels be in 1-25 years?**
- **Where will the companies be that made them in 1-25 years?**



# Who's still around?

## Who's responsible?

- BP Solar
- Solarex
- Suntech
- Evergreen
- Sharp Solar
- Bosch Solar
- Astropower Solar
- Solyndra
- Sun Edison
- ARCO Solar?
- Schott Solar
- Trace Engineering
- PVI Inverters
- OMNION Inverters
- Solec Solar
- UNI Solar
- Exxon Mobile
- Motorola
- Photowatt
- Shuco
- Sungivity
- Cronar
- APT
- Open Energy
- Westinghouse Solar
- ECD
- Phillips
- Hanwa
- PV Powered
- Satcon Inverters
- Best Inverters
- Photocomm
- EPV Solar

# **SOLAR IS NOT ALWAYS FREE!!!!**

**Solar recycling and handling of End of Life solar panels is NOT free. Just like the cost of permitting new solar installations, the replacement of aging inverters and other components, and the addressing of the EOL solar should be a line item on every solar installation!**

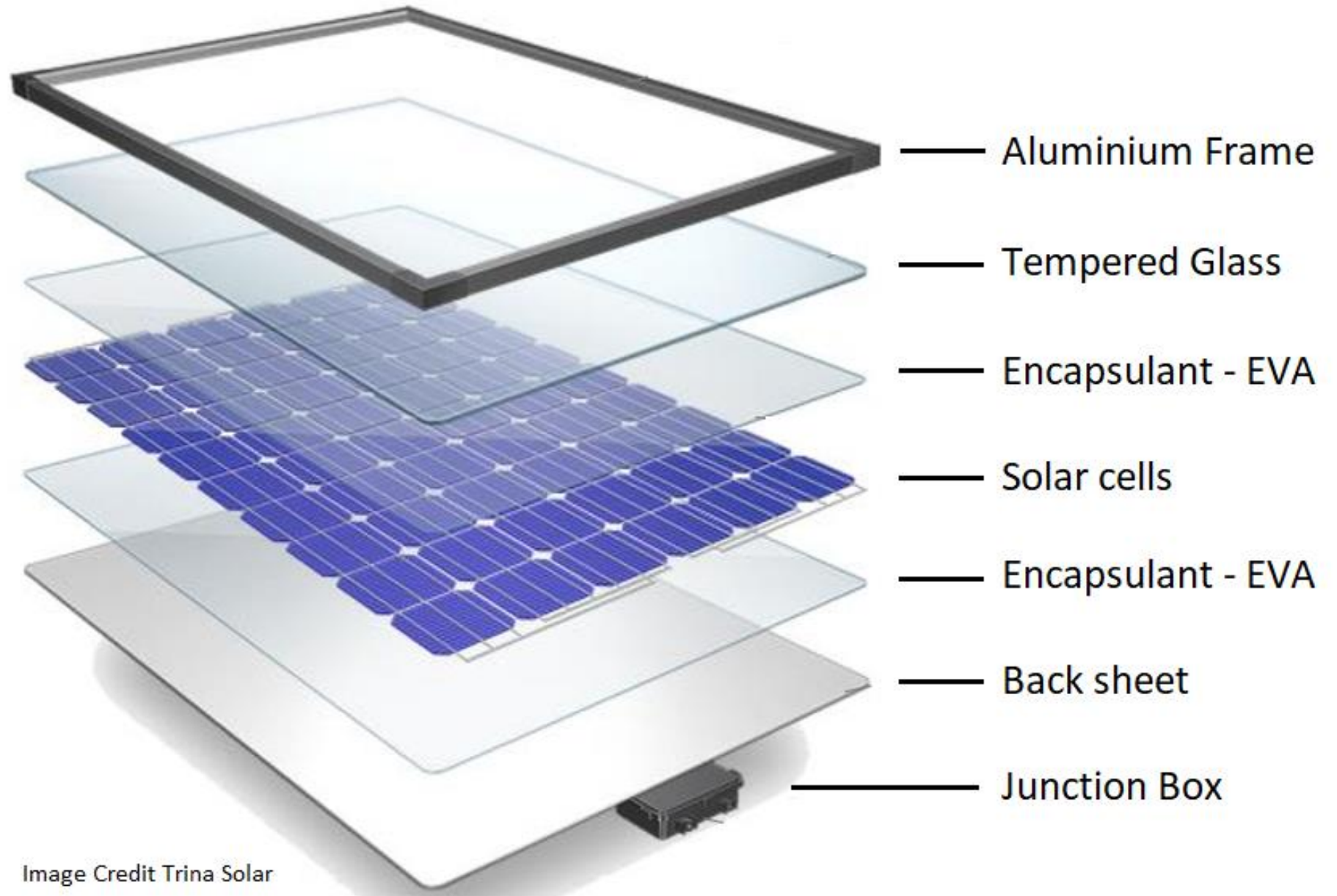
**Today, it costs \$15 to \$45 to process solar panels in the USA.  
Our goal is to cut these prices in half within the next 18 months.**

**Is your company considering the cost for decommissioning when a solar system is sold? Who should bare the cost?**





# What's in a solar panel?



# Who is REALLY doing their part to recycle PV?

The Solar Industry has recycled *very little* of what it has produced over the last 40 years. It's unknown to most companies, what to do with broken, failed, discarded solar panels that are removed from service.





A photograph showing a close-up of a solar panel array in the foreground, with a nuclear power plant's cooling towers visible in the background under a clear blue sky. The solar panels are brown and framed by metal. The cooling towers are white and cylindrical. The text "Where does all this solar waste go after it's served us well?" is overlaid on the image.

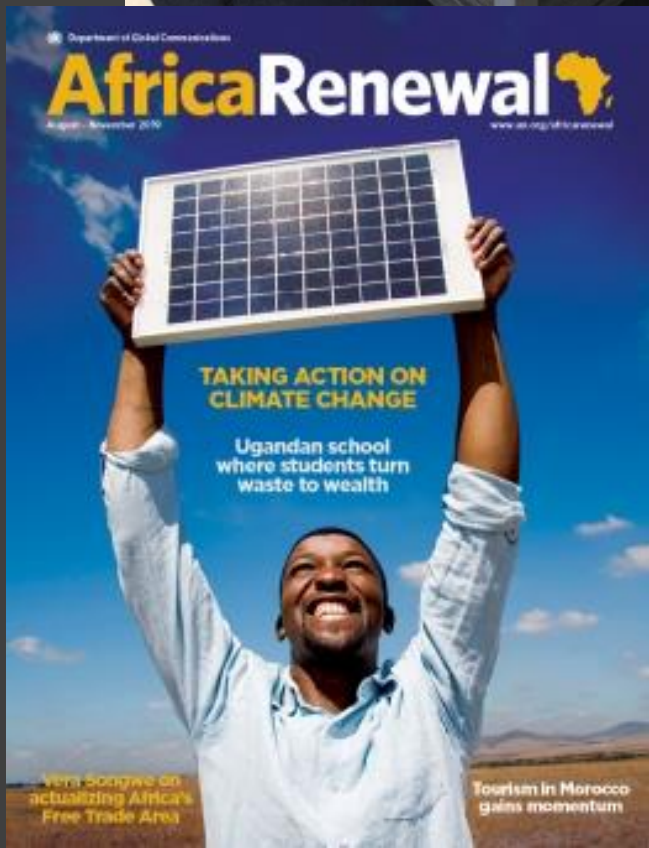
Where does all this solar waste go  
after it's served us well?



# What is the solution?

- Collect End of Life panels
- Sort into separate categories:

- a) Undamaged- Clean, test and resell/donate.
- b) Repairable- refurbish, test and resell/donate for off-grid use.
- c) Recycle everything else and turn the old solar panels into new products





# Don't let solar go to waste!

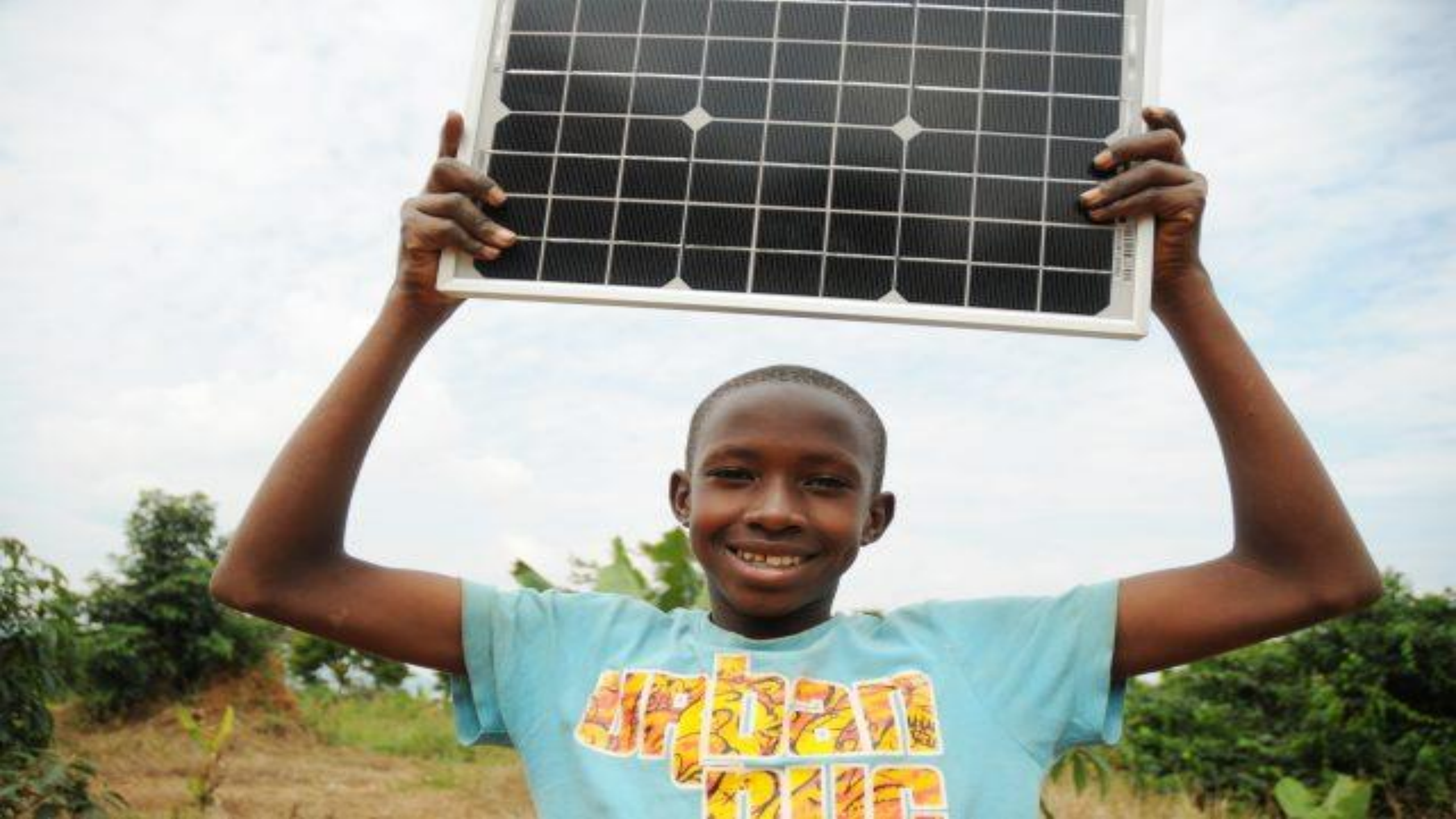






Reuse Solar for good





# Challenges with the Washington State Solar Recycling Bill/Regulation

- Companies importing into Washington State must apply and be approved by the state individually. Few, if any companies have begun the application process.
- Solar installers may have fewer choices from their solar panel suppliers.
- The burden of collection, logistics, and the costs associated with processing solar panels for solar manufactures is expensive. It will be very difficult for each manufacture to create their own 50+ collection stations within the state of Washington to fulfill the current law.

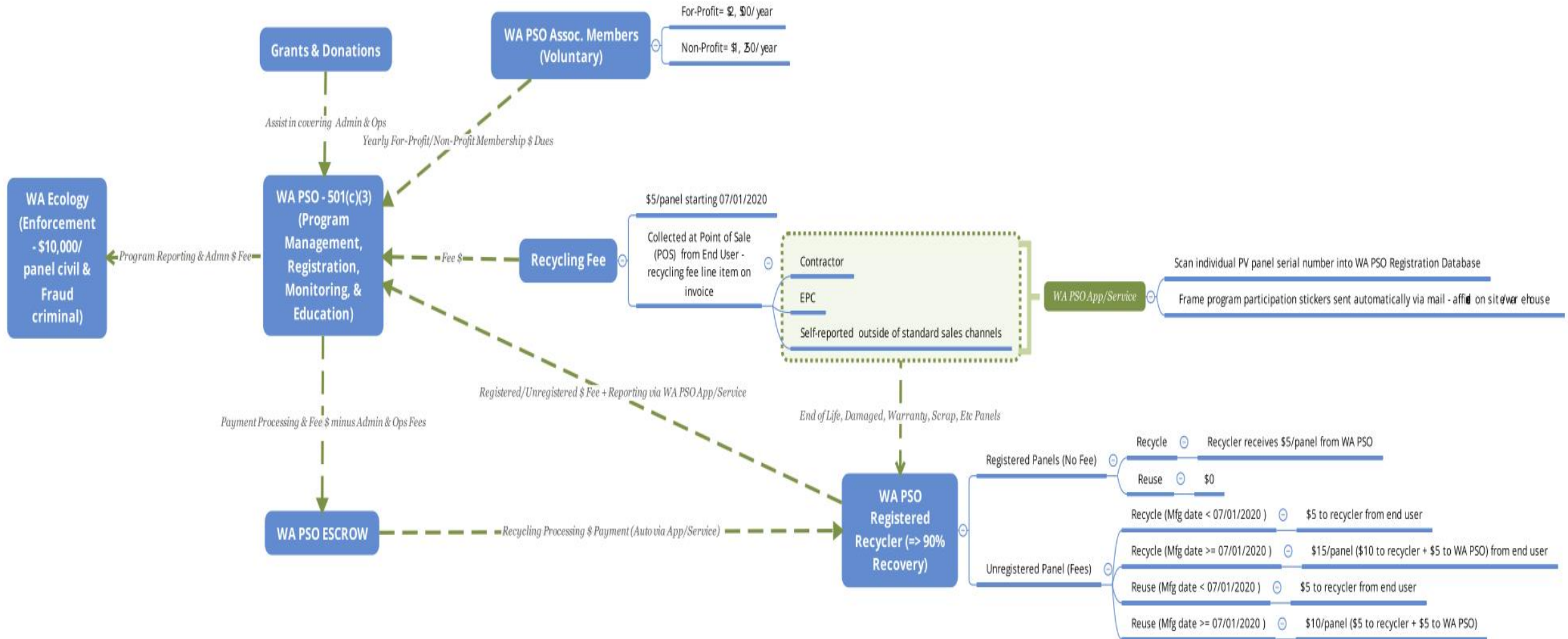


# Other industries and their recycling programs

- **ALUMINUM CANS:** Americans recycle approximately 67% of all aluminum cans and this amounts to approximately \$800,000,000 each year in revenue. \*
- **PLASTIC BOTTLES:** Americans recycle approximately 1,000,000,000 pounds of plastic bottles in 2017. \*
- **BATTERIES:** 97% of car batteries are recycled. \*
- **OTHER:** Many states have subsidized programs to support the collection and recycling of flat screen TV's, computers, car tires, mattresses, paints. \*
- **Solar** ... less than 10% products are being recycled today.

\*collection and recycling is funded by end users at time of purchase

# WA PV Reuse-Recycling Program Proposal Overview (Draft - 09/04/19)







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⚡ BUSINESS INSIDER · 6 MIN READ

**Tesla solar panels have become a nightmare for some homeowners, es...**





**Briana Greer's Colorado home after her Tesla solar panels caught fire on August 1, 2019.** Briana



# FIRST PORTABLE SOLAR PANELS RECYCLING PLANT







**A MINE...  
...WITHOUT THE MINE**

# 100 %

**Thin Glass**  
**\$60-\$80**

**Copper**  
**\$1500-\$3000**

**Glass**  
**\$80-\$100**

**Plastic**  
**\$200-\$500**

**Silicon**

