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Solar Panel Recycling in The United States

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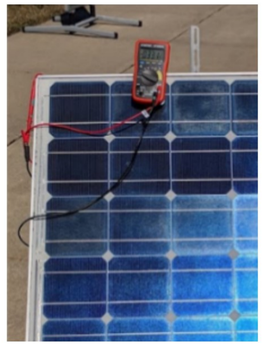
Introduction

- Solar panels are a beneficial growing renewable energy source.
- On average solar panels have a life span of 25-30 years.
- Decommissioned panels will contribute to a growing waste management problem that will impact the environment.
- By reducing, reusing, and recycling end-of-life panels, a reduction in hazardous waste in landfills is possible.

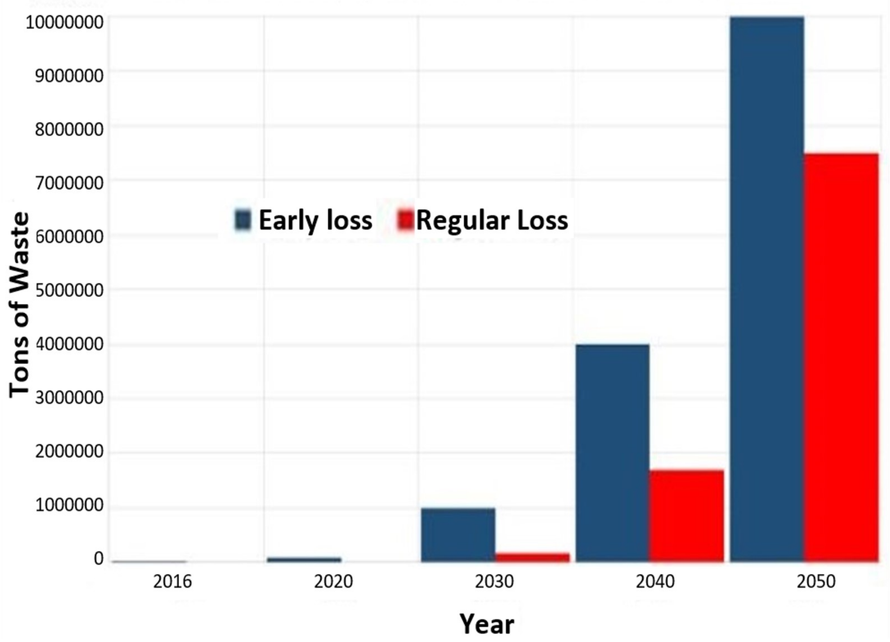
Objectives

1. Review of the current Solar Panel Waste Management Systems across the United States
2. Create test procedures to evaluate PV panel viability and efficiency.
   a) Position panel stand facing south
   b) Mount PV panel
   c) Set voltage and amperage on multimeter
   d) Compare reading to manufacturing specifications



Discussion

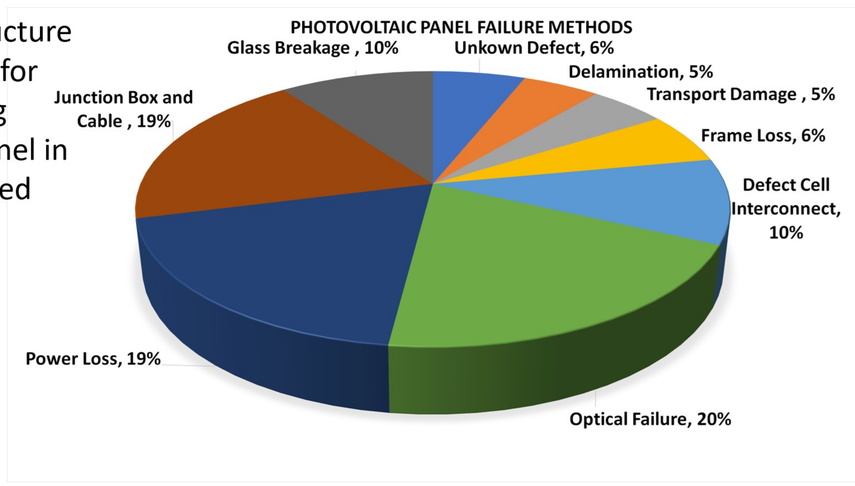
Estimated Cumulative Waste Volumes of end-of-life PV Panels in U.S.



- Developed test procedures and process to measure the efficiency of the solar panels.
- Conducted a review of current infrastructure in place for recycling solar panel in the United States.

Challenges

- Solar panel instillation rates and decommissioned amounts will continue to rise.
- Accessibility for end-of-life panels is few and far between, with only 2 companies in the U.S. being solely dedicated to recycling panels, as of 2019.
- Only 3 states, Washington, North Carolina, and New Jersey have implemented laws pertaining to solar panel waste.
- Panels often fail before their expected life span, creating more waste (early-loss scenarios).



Impact

- Waste expected to approach 8 million tons annually in next 30 years.
- Recycling solar panels is expected to be a $40 billion industry by year 2035.
- The waste contribution produced is from 2 to 8 g CO2 eq/kWh.
- Valuable resources like precious metals and silicon are being lost resulting from discarding solar panels in landfills.
- These resources are estimated to be worth around 22 billion dollars combined in current panels.

- There was an estimated **196 million pounds** of PV waste in **2020**, equivalent to over **270 fully loaded jumbo jets**

Conclusion/Solutions

- A review of current processing techniques has been shared and found the following:
  - New alternative methods for recycling PV panels needs to be
  - Panel manufacturers should prioritize design for dissembling and reduce raw material usage.
  - PV recycling industry is expected to become profitable when the incoming PV waste reached 19,000 tons/year.
- The level of the marginal capital cost of each PV take-back center, cost of reverse logistics, distance traveled, and the amount of PV waste collected from various locations need further development

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