
Solar End of Life Options: Decommissioning vs. Repowering

— Saxon Metzger —

Presentation Summary

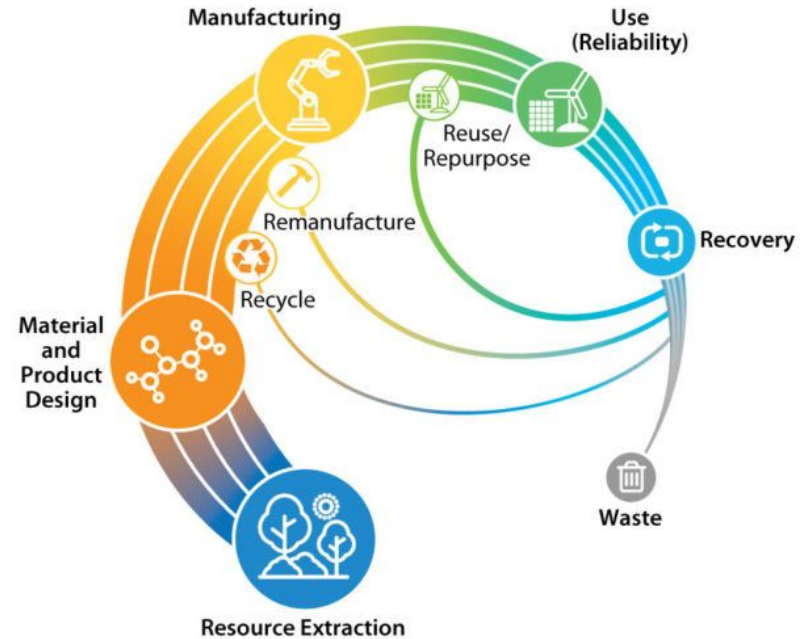
Will address three main topics:

- Why is solar end of life an issue that should be addressed?
- What is the difference between decommissioning and repowering, and what are the costs/benefits of each?
- What are some of the unique nuances and changes coming to this discussion domestically and internationally?



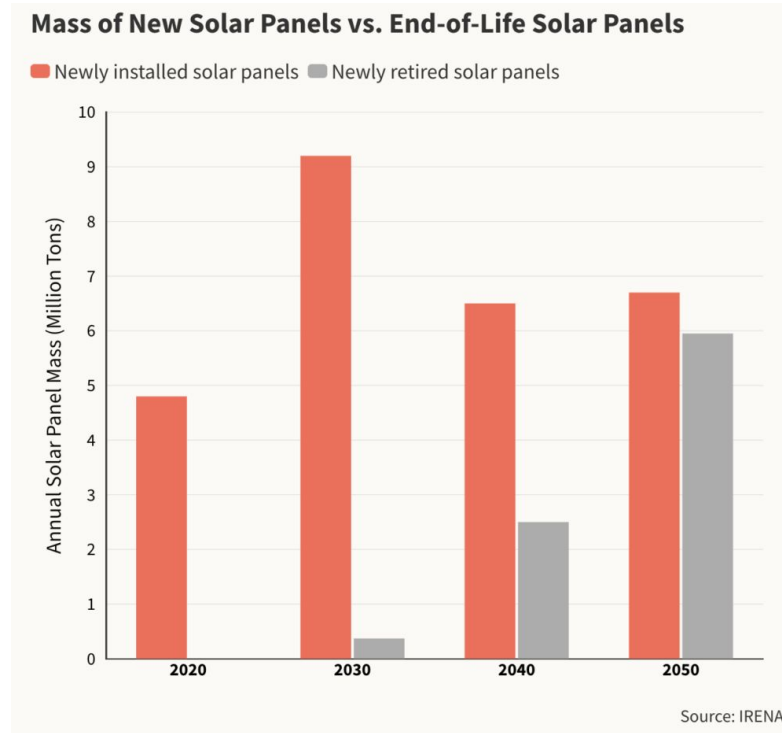
A Brief Introduction to Solar End-Of-Life/Circularity

What is decommissioning?



Why Care?

It's a Big Issue, and Big Business



Decommissioning vs. Repowering: An Overview

Decommissioning: To return a particular project location to its original condition prior to the installation of a solar project

- Completely removing all panels, racking, EBOS, etc from the site
- Typically requires roofing/structural work on roof top systems and grass reseeding and potentially regrading for ground mounts.

Repowering: Taking an existing solar site and replacing failing or failed components to extend the overall lifespan of the project

- Replacing central inverters with string inverters
- Replacing panels with better, higher wattage panels
- Replacing damaged RSS, MC3 or 4 connectors, or other EBOS

Determining Repowering Viability

1. Review client or bid expectations. Is it even an option?
2. Assessing panel and other material condition and age
3. Determine the interoperability of the site with other technologies
4. Receive quotes to ensure the work can be performed
5. Perform a cost-benefit analysis

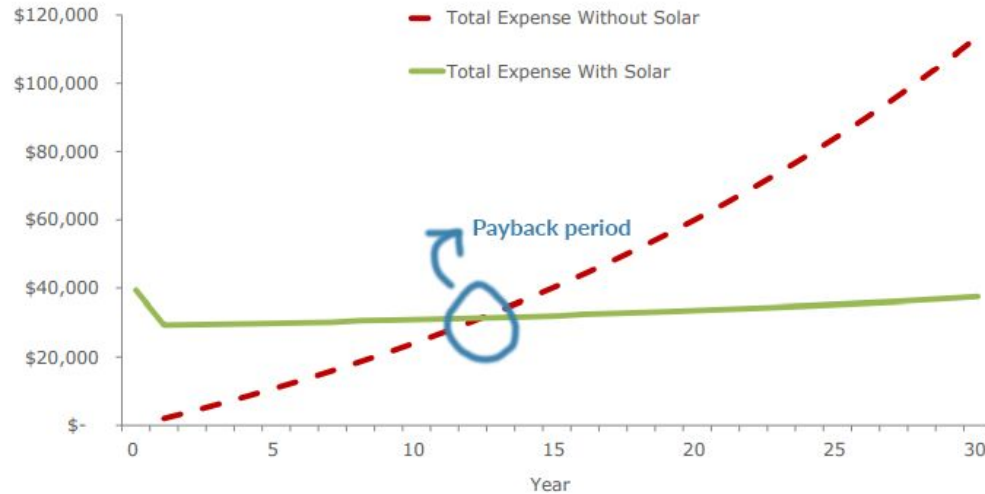
Issues with Decommissioning (1)

- High labor costs of removal
- Recycling costs
- Some sites are perfect for solar / will have solar reinstalled!



Issues with Decommissioning (2)

- Economic Inefficiency = Waste if we don't have solar sites active



Issues with Repowering (1)

- Investment costs
- Permitting challenges

2023 NEC

5,962 Public Suggestions

2,705 Revisions Made

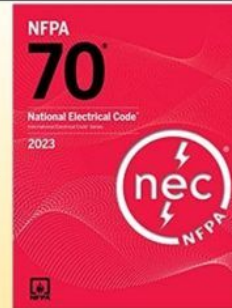
Changes Include

Editorial Clarification

Expanded Requirements

New Requirements

Deleted Requirements



Issues with Repowering (2)

- Infrastructure compatibility
- Energy production disruptions + Unknowns



Issues with Repowering (3) - Avoiding the Inevitable?

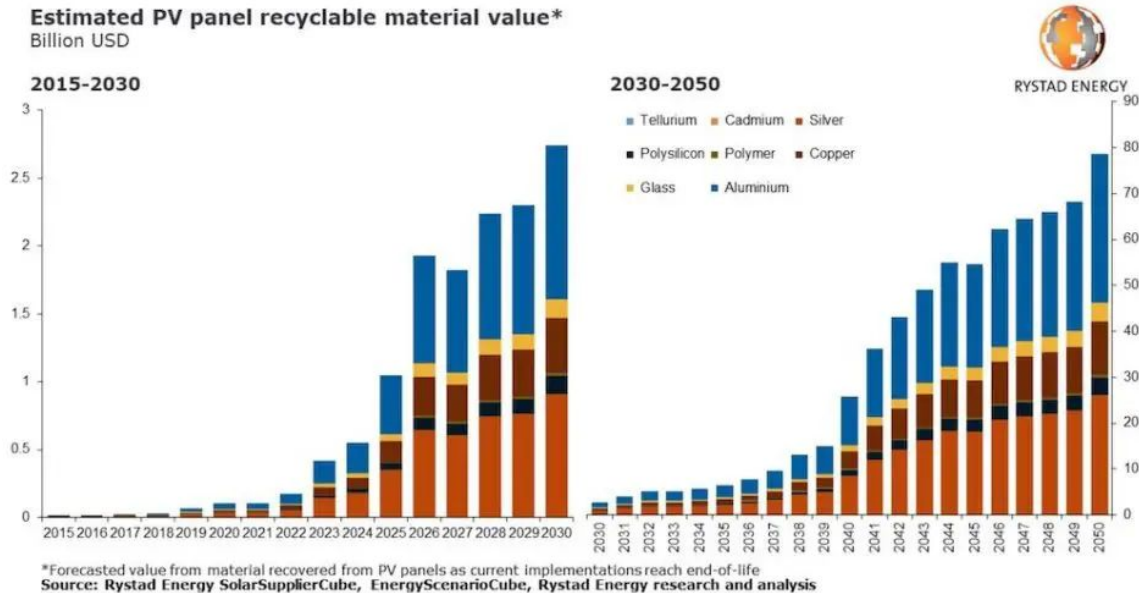


Economic Impacts of Repowering

- Short-term financial benefits
- Energy output can come online much quicker

Economic Impacts of Decommissioning

- Financial implications
- Benefits of material recovery



Environmental Considerations

- Impact comparison determines the sustainability of repowering
- Ongoing O&M makes a difference
- Types of technologies are critical
- Resell of remaining assets is a key factor: Energybin

Changing the Cost/Benefit with Innovative Approaches

- Innovations reducing decommissioning costs.
- Technologies enhancing repowering benefits.
- Potential to shift economic decisions.
- Visual: Diagram of technology impact on cost/benefit analysis.

Approaches to Solar End of Life - Customer Choice

- High Labor Cost / Research
- Not always possible in every market
- Let client choose with all the options that you have presented

Approaches to Solar End of Life - Sustainable Option Only

- Good for sustainability metrics
- Bad for business, if you don't clarify assumptions in your bid



Approaches to Solar End of Life - Niche Focus

- Focusing on this kind of work builds relationships
- Relationships create local, regional, and international options



Main Determinant? Feasibility

- Cost
- Labor
- Technological Ability
- Client Engagement

Solution?

- Your Site Walk
- Client Discussions



Boosting Client Engagement

- Marketing repowering
- Creating potential for collaboration
- Appropriate provisions and explanation of options
- Typically less up front cost compared to decom/new install

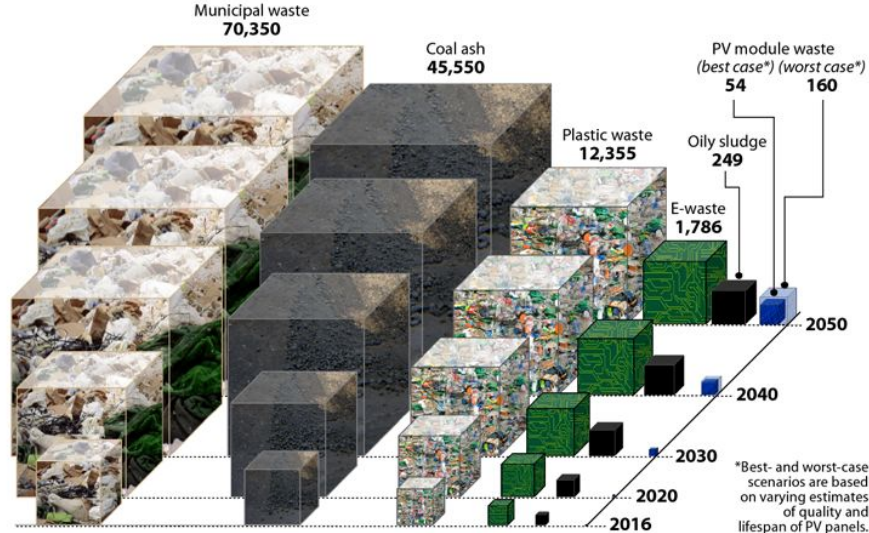
Conclusion + Reality Check

Solar Panel Waste in Context

Researchers compared global waste estimates generated from landfills, fossil fuel production and e-waste. While waste from electronics and photovoltaic modules will certainly grow in the coming years, they will remain a fraction the amount of other sources.

GLOBAL CUMULATIVE WASTE

In millions of metric tons, 2016-2050



SOURCE: Heather Mirlletz et al., *Nature*

Inside Climate News