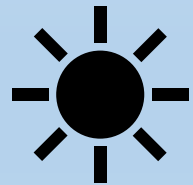


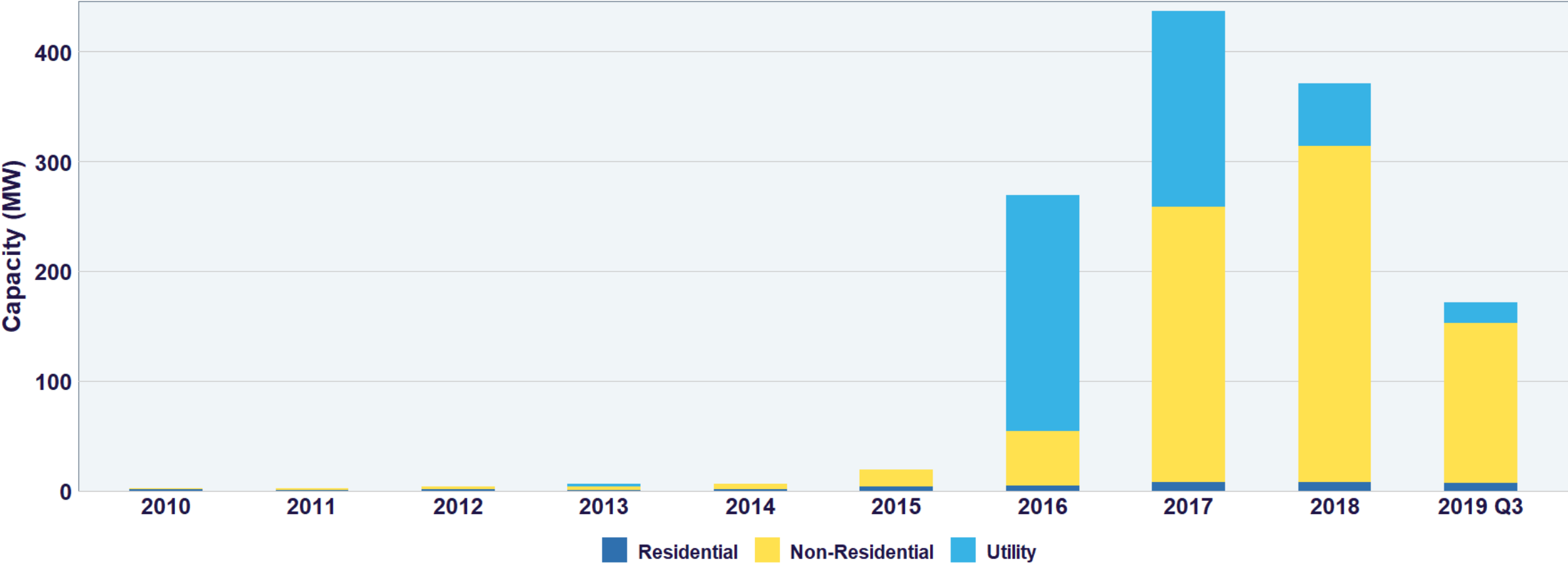


- Rick Tisdale: Sr. Sales Engineer
- Solar developer in twin cities for 12 years
- Growing company about 40 employees and installed over 12 Megawatts in 2019



**Fun Fact:** In one hour the sun produces enough energy to power the world for an entire year!

# Minnesota Annual Solar Installations

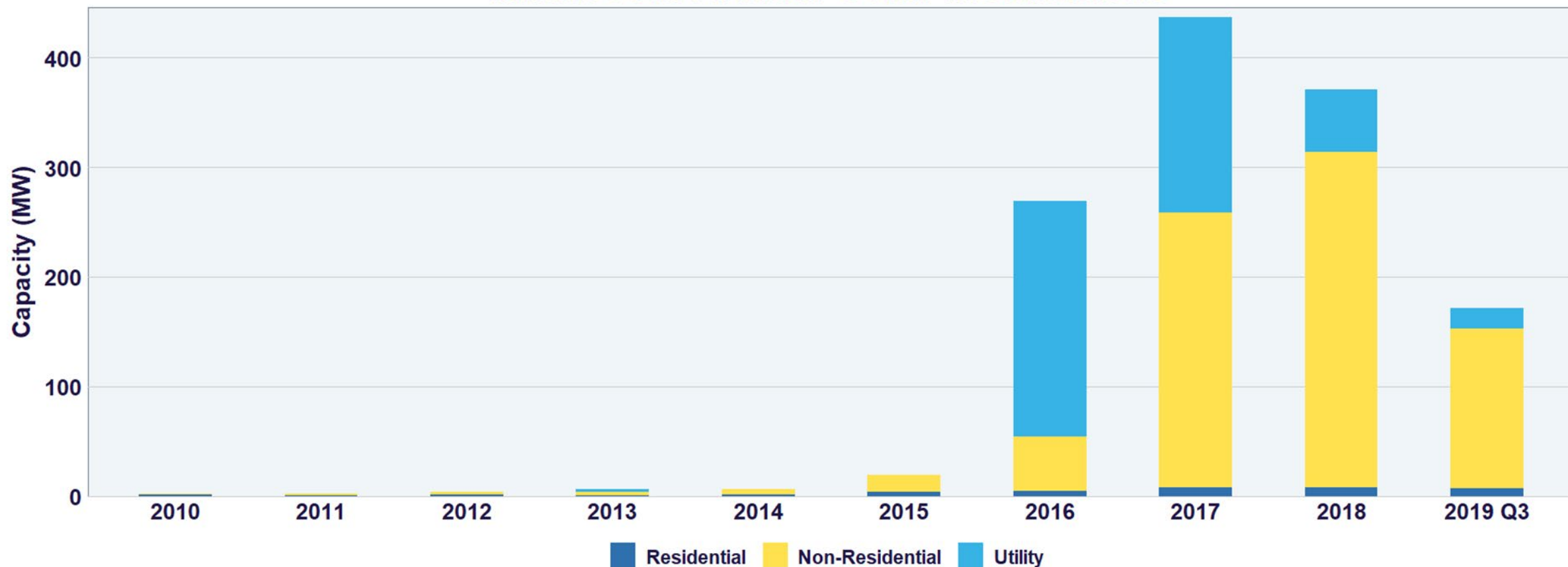


[SEIA solar policy](#)

- To date 1,287 MW have been installed in Minnesota
- Approx. 5.9 million solar panels or 295 million pounds
- Projections: Another 2.1 million panels and 105 million pounds in the next 5 years

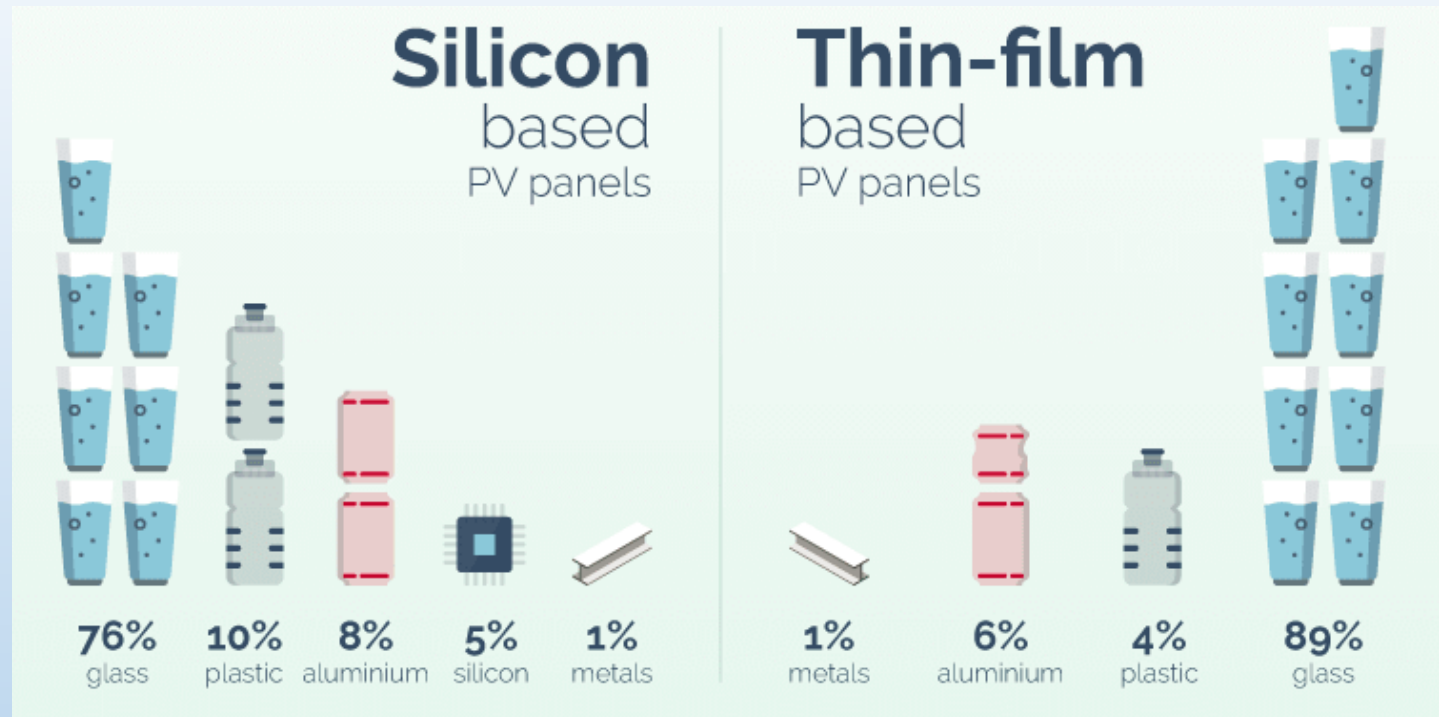
# What Is Fueling Growth?

## Minnesota Annual Solar Installations



- New financing options: Credit Unions and PACE financing
- 35% decrease in cost in the last 5 years

# How Are the Panels Recycled?



Source: [GreenMatch.com](https://www.greenmatch.com)

- 1). Removing the aluminum frame (100% reusable)
- 2). Separating the glass along a conveyor belt (95% reusable)
- 3). Thermal processing at 500 degrees Celsius  
\*\*This allows for the evaporation of small plastic components and allows the cells to be easier separated.
- 4). Etching away silicon wafers and smelting them into reusable slabs (85% reusable)

Source: [GreenMatch.com](https://www.greenmatch.com)

# Case Study: First Solar, USA Panel Manufacturer

- **Mandatory Recycling:**

- Recycling fee built into the cost of the panel
- Service to recycle is paid for at the end of panel's life



Source: [GreenTechMedia](#)

- **Ways to Recycle:**

- Recycling panels at factory where they were built
- Mobile recycling unit being developed to mitigate unnecessary shipping for large projects or solar garden

- **Industry Standard:**

- U.S does not have an industry standard yet
  - \*\* solar product stewardship law adopted by Washington in 2018
- Europe has standards in place: PV cycle created by The Waste Electrical & Electronic Directive (WEEE)



## Moving Forward:

*“2016 study by the International Renewable Energy Agency (IRENA) estimates the recyclable materials in old solar modules will be worth \$15 billion in recoverable assets by the year 2050”* [Source: Civic Solar](#)

- It is likely that larger projects like solar gardens will have a plan in place to recycle panels at the end of their life
- Residential solar recycle plan is less predictable
- Most Panel warranties last 25 years



Source: [cleantechnica.com](http://cleantechnica.com)