



# The Evolving Market Structure of the U.S. Residential Solar PV Installation Industry, 2000–2016

*Study shows that over 8,000 companies have installed at least one residential solar photovoltaic (PV) system and that the residential PV installation industry has become more concentrated over time.*

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Market structure refers to the number of firms and the distribution of market shares among firms within an industry. In *The Evolving Market Structure of the U.S. Residential Solar PV Installation Industry, 2000–2016*, we examine market structure in the context of residential solar PV. We find that over 8,000 companies installed at least one residential PV system between 2010 and 2016, and about 2,900 companies were active in 2016. Most residential PV installers are relatively small companies, with about half of installers having installed fewer than five systems in that period. At the same time, a subset of high-volume installers accumulated market share, especially beginning around 2010 with the emergence of alternative customer financing options.

## Data and Methods

The study data are from the Lawrence Berkeley National Laboratory’s Tracking the Sun data set, which consists of installed PV system data from more than 60 PV incentive and interconnection programs. The study data—after cleaning—consist of 938,955 systems installed between 2000 and 2016 in 24 states.

We characterize market structure according to multiple metrics, including the number of active installers and the market share of the industry’s highest-volume installers. For the purposes of our study, an installer is “active” in a given year if that installer installed at least one system within that year. An installer’s market share is the number of systems installed by the installer divided by the total number of systems installed in a given market within the full year. For the sake of simplicity, this fact sheet presents national-level results. The full study (referenced below) reports results at the state, county, and local market levels. The full study also reports results using two additional market structure metrics omitted from this fact sheet.

## Results and Conclusions

About 8,700 different companies installed at least one residential PV system between 2000 and 2016, and about 2,900 installers were active in 2016 (Figure 1). About half of these companies installed fewer than five systems, and many companies may represent firms from related industries (e.g., electrical contracting) that install PV as a side business. At the same time, more than 800 companies installed more than 100 residential PV systems, and more than 100 companies installed more than 1,000 systems in the study period.

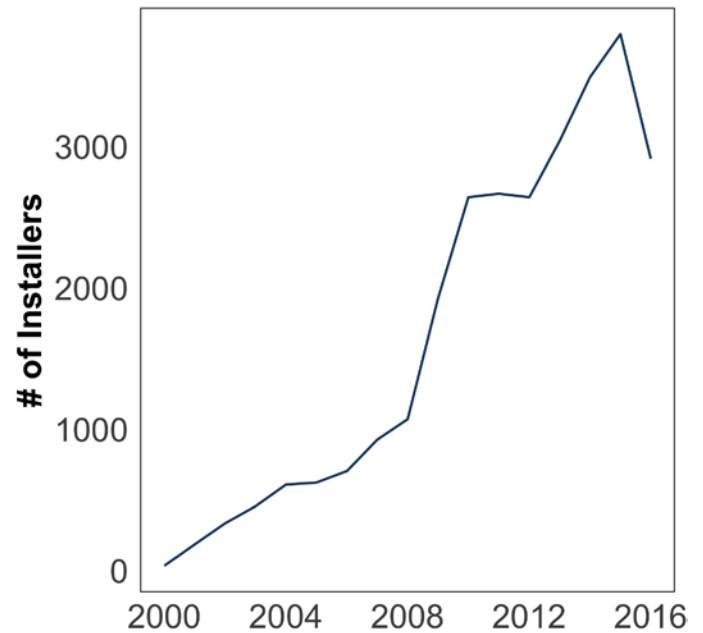


Figure 1. Number of installers, 2000–2016 (inset depicts number of systems installed)

Market concentration refers to the degree to which market shares are disproportionately distributed. The residential PV industry initially became less concentrated in the early 2000s, as many low-volume installers entered the early market and increased

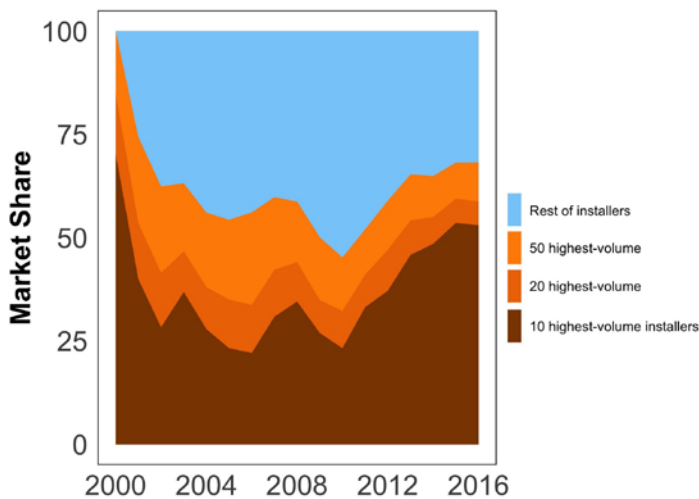


Figure 2. Market shares of highest-volume 10, 20, and 50 installers, 2000–2016

competition with incumbent installers. However, the residential PV industry has become more concentrated over time, especially beginning about 2010 (Figure 2). A subset of the industry’s highest-volume installers has accumulated market share, even as the number of installers continued to increase. These trends in market concentration are observed at lower market levels. See the full report for details.

Previous studies<sup>1</sup> suggest that residential PV market concentration may be associated with the emergence of customer financing options. In this model, customers host third-party owned (TPO) PV systems and pay for system output in lieu of purchasing a PV system upfront. For several reasons, high-volume installers can more effectively offer TPO products than low-volume installers can. And, our data are consistent with this hypothesis. We find that relatively few installers have offered TPO products despite their popularity with customers (Figure 3). As a result, TPO sales have largely accrued to a subset of high-volume installers, driving market concentration. The slight reduction in market concentration in 2016 (see Figure 2) may be associated with a recent reduction in TPO popularity with customers as up-front costs for system ownership continue to fall.

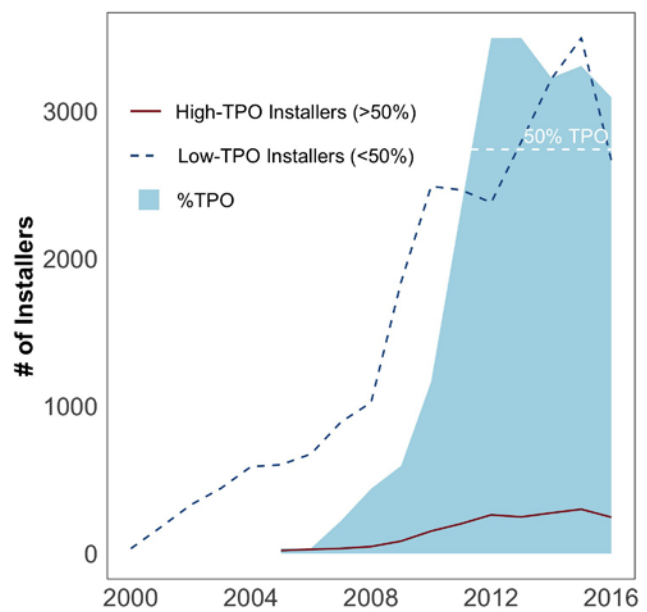


Figure 3. Number of high-TPO versus low-TPO installers with TPO market penetration (%TPO), 2000–2016

However, we do not find that residential PV market concentration has occurred at the expense of lower-volume installers. Even after the emergence of TPO products, the industry’s low-volume installers increased installation volumes even while ceding market shares to high-volume installers. Furthermore, though market concentration has increased over time, the U.S. residential PV market is still relatively un-concentrated under standards defined by the U.S. Department of Justice. The ongoing implications of residential PV market concentration are areas for future research.

## More Information

For more information, download the full technical report: O’Shaughnessy, Eric. 2017. *The Evolving Market Structure of the U.S. Residential Solar PV Installation Industry, 2000–2016*. NREL/TP-6A20-70545. Golden, CO: National Renewable Energy Laboratory. <https://www.nrel.gov/docs/fy18osti/70545.pdf>.

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1. See for example Schmalensee et al. 2015. *The Future of Solar Energy: An Interdisciplinary MIT Study*. Massachusetts Institute of Technology.