

## Lowering Soft Costs – a Major Opportunity for Growth

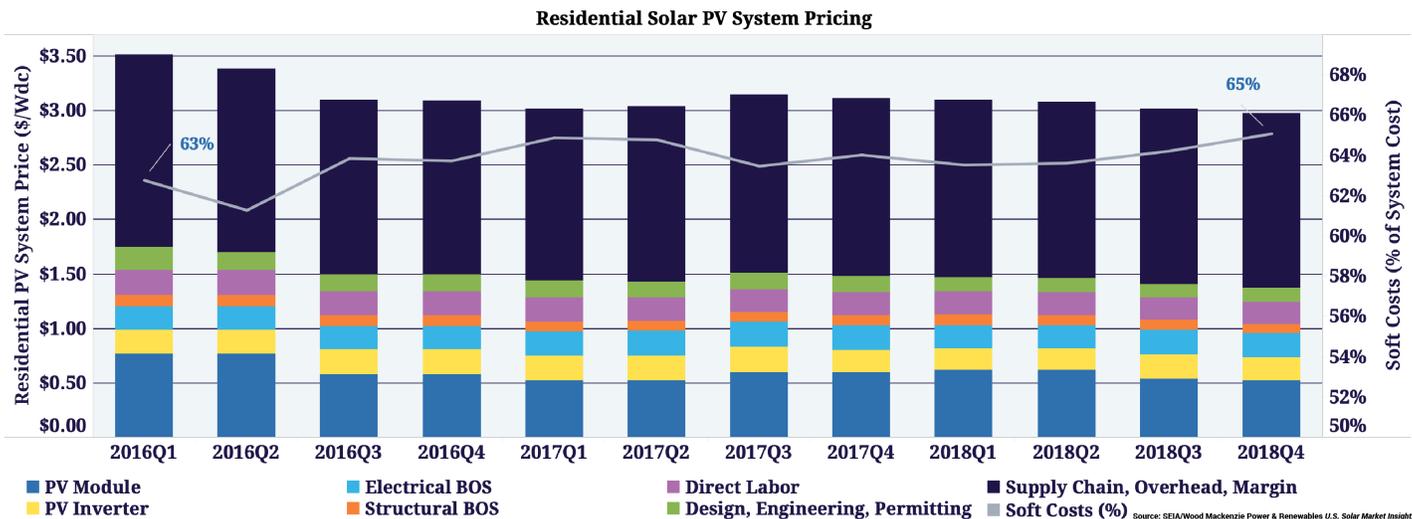
### Soft Costs vs. Hardware Costs

The cost to install a solar photovoltaic (PV) system includes two broad cost categories: hardware costs and soft costs.

- **Hardware costs** include all the materials needed to construct the system: module, inverter, racking, and electrical wiring.
- **Soft costs** include the cost of installation labor, the cost of all relevant permits, and all overhead costs including the marketing, sales and administrative costs associated with the system.

### Non-hardware Costs Account for a Growing Share of Overall Solar Prices

As of Q4 2018, a typical 6 kilowatt (kW, or 6,000 watts) residential rooftop solar PV system costs roughly \$18,000 before any state or federal tax credits or other incentives. On a per-watt basis, that equates to \$3.00/watt or \$3,000/kW. Of this cost, [roughly 2/3rds are composed of soft costs](#) associated with the sale, permitting and installation of the system. While the total cost of residential PV systems has declined by more than 65% over the last decade, hardware costs have fallen much faster than soft costs. Therefore, the soft cost share of total residential system cost has risen from 58% of total system cost in 2014 to 65% today. A primary factor driving this increase is **direct and indirect costs associated with permitting and inspection**.



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While there are direct costs associated with permitting (currently \$0.13/watt), the indirect costs of permitting can be much higher. Permitting and inspection practices are inconsistent across jurisdictions, so installers must take the time to become familiar with the practices of each jurisdiction they want to work in. Municipal permitting and inspection resources also vary greatly, and in some communities the gap between system installation and an inspector's permission to operate might take months. These complications lead to higher labor and overhead costs on the part of

the installer, and in some cases can lead to the outright cancellation of the project by the customer. Based on data from our members, SEIA estimates that a one week delay in system installation due to permitting, inspection and interconnection processes [increases the client cancellation rate by 10%](#). The total direct and indirect cost of permitting for a residential system is on the order of \$1/watt (or \$6,000 – \$7,000 per system) for residential solar PV systems. Outside the U.S., soft costs and specifically permitting costs are much lower.

## Federal Action Needed to Reduce Soft Costs

SEIA is working with our members and is in discussion with national labs on possible analysis and programs that will allow us to better understand and address this problem. While the Department of Energy has [correctly identified rising soft costs as an issue](#) and has funded several small programs to address it, more effort is needed to address the cost issue. While this issue impacts every residential and commercial installation company (and the upstream companies that sell to them), no single company or group of companies has the convening power to take on the full scope of the issue. In short, with a modest amount of federal support, the industry can work collaboratively with government to reduce the red tape and barriers that have slowed the pace of price decline in the industry, ultimately leading to lower costs of electricity for consumers.

**Today, non-hardware costs account for more than 65% of the total cost to install residential solar**

## Resources

- From: SEIA/Wood Mackenzie *U.S. Solar Market Insight*
  - [Soft Costs as Percentage of Total Residential System Costs](#)
  - [Additional Information on Current State of Solar](#)
- From: NREL
  - [U.S. Solar Photovoltaic System Cost Benchmark: Q1 2018](#)
  - (See Figure ES-2, p. 10)
- From: SEIA
  - [Solar Automated Permit Processing \(SolarAPP\) Overview](#)
  - [SolarApp Press Release](#)
- From: Rocky Mountain Institute & Georgia Tech
  - [Lessons from Australia: Reducing Solar PV Costs Through Installation Labor Efficiency](#)
  - Documents disparity in residential solar PV soft costs between the U.S. (65% of total system cost), Australia (25% of total system cost) and Germany (15% of total system costs)
- From: U.S. Department of Energy, Solar Energy Technologies Office
  - [Soft Costs Subprogram Overview](#)
  - [Soft Costs Fact Sheet](#)