



ASSESSING THE NEW HOME MARKET OPPORTUNITY: CASE STUDY AND COST MODELING FOR SOLAR AND STORAGE IN 2030

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Introduction

With approximately 1 million new homes constructed every year in the United States, this represents a significant opportunity for solar and storage installations. It is not clear how solar and storage is incorporated into the new construction process and at what cost. Further, it is unclear what barriers or opportunities exist to scale this model nationwide. To fill this gap in the literature, this research conducts a case study of Mandalay Homes’ new solar and storage community in Arizona to gather lessons learned. From this foundation, we further generate a set of pathways to reduce install costs and expand solar and storage market penetration in this sector.

New Construction Cost Benchmarking

We developed a new Q1 2020 cost benchmark for a new construction, residential solar and storage installation. This benchmark was generated using the bottom-up cost model developed by NREL.

Retrofit 7kW residential solar and AC-coupled storage systems (3kW-6kWh to 5kW, 20kWh) cost \$28,371 to \$37,909 in 2020, which is significantly higher than installing solar alone. Costs are projected to decline through 2030, but at varying rates.

Category	2020 Retrofit Case	2020 New Construction Benchmark	Assumptions, From Retrofit to New Construction
PV System Size	7 kW	4 kW	Current residential PV sizes are smaller
Battery System Size	3 kW/6 kWh	3 kW/6 kWh	No changes
PV Module Efficiency	19.5%	19.5 %	No changes
PV Inverter Price	\$0.25/Wdc	\$0.25/Wdc	No changes
PV Module Price	\$0.41/Wdc	\$0.41/Wdc	No changes
Lithium-Ion Battery	\$253/kWh	\$253/kWh	No changes
Battery-Based Inverter Cost	\$174/kWh	\$174/kWh	No changes
Structural Balance of System (BOS)	\$589	\$595	Slight change due to revised model construction and inflation
Electrical BOS	\$2,755	\$2,538	Change due to revised model construction and inflation, and revised PV size
Supply Chain	\$2,025	\$1,359	Change due to revised model construction and inflation, and revised PV size
Sales Tax	\$704	\$514	No change in 5% tax rate; cost declines given total installation cost declined
Installation Labor (Burdened) and Equipment	\$2,252	\$1,996	Slight change due to revised model construction and inflation, and revised PV size
PII	\$1,668	\$1,273	PII reduced by 25% (Feldman et al., 2021)
Overhead (General and Administrative)	\$3,584	\$3,637	Slight change due to revised model construction and inflation
Sales and Marketing (Customer Acquisition)	\$ 5,496	\$3,221	Sales and marketing costs reduced by 25% (Feldman et al., 2021)
Profit (%)	\$2,164	\$1,758	No change in profit margin %; cost reduced due to revised PV size
Total	\$28,371	\$22,105	Reduced by 22%

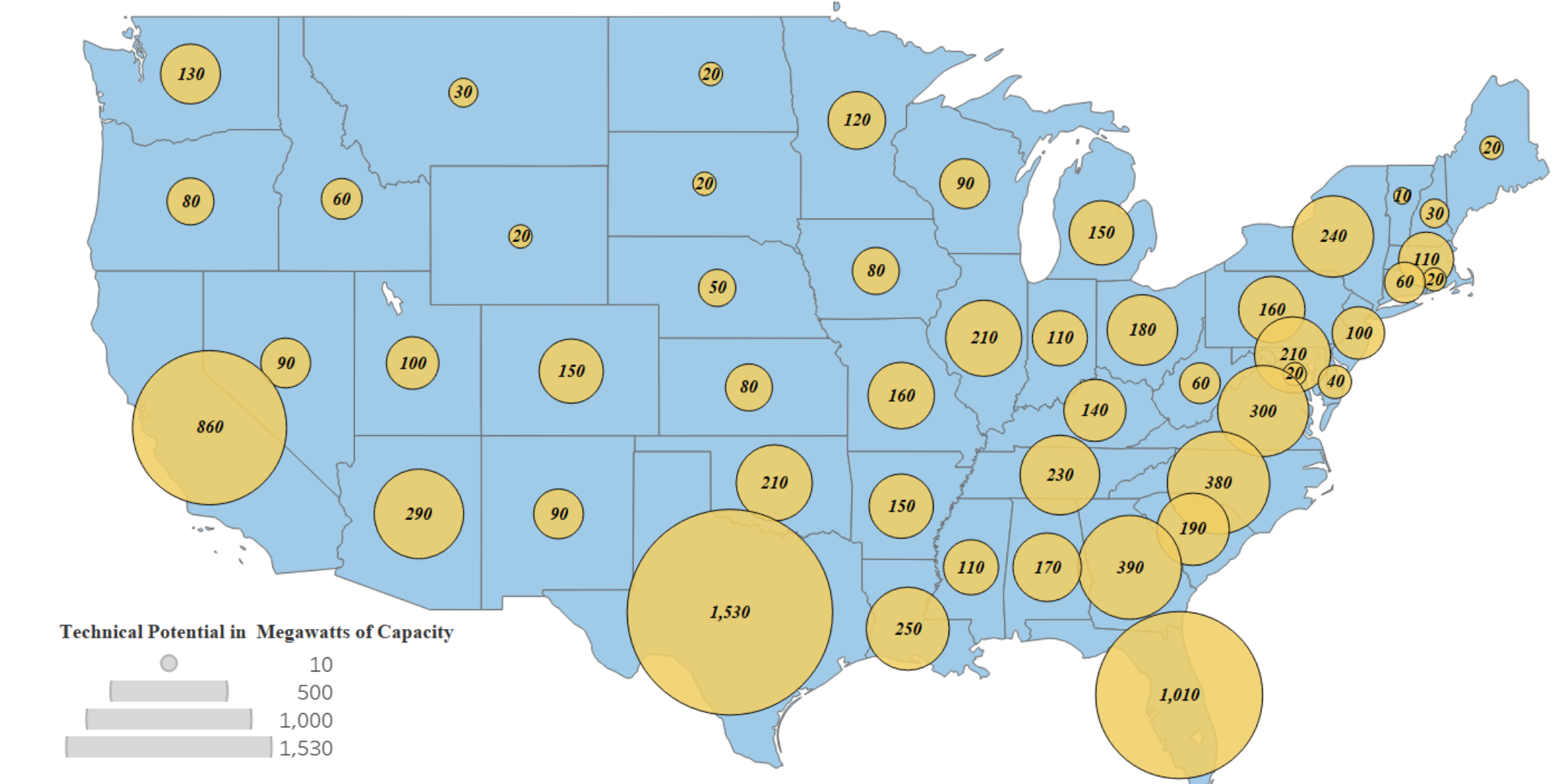


Figure 1. Projected annual average technical potential for residential rooftop PV at the time of new construction between 2017 and 2030

Method Part I: Mandalay Homes

We analyzed the 150 homes built by with Mandalay Homes, a leading residential and storage new construction homes builder, located in Prescott Valley, Arizona. Solar and storage system elements are installed separately, with solar getting installed first and then energy storage.

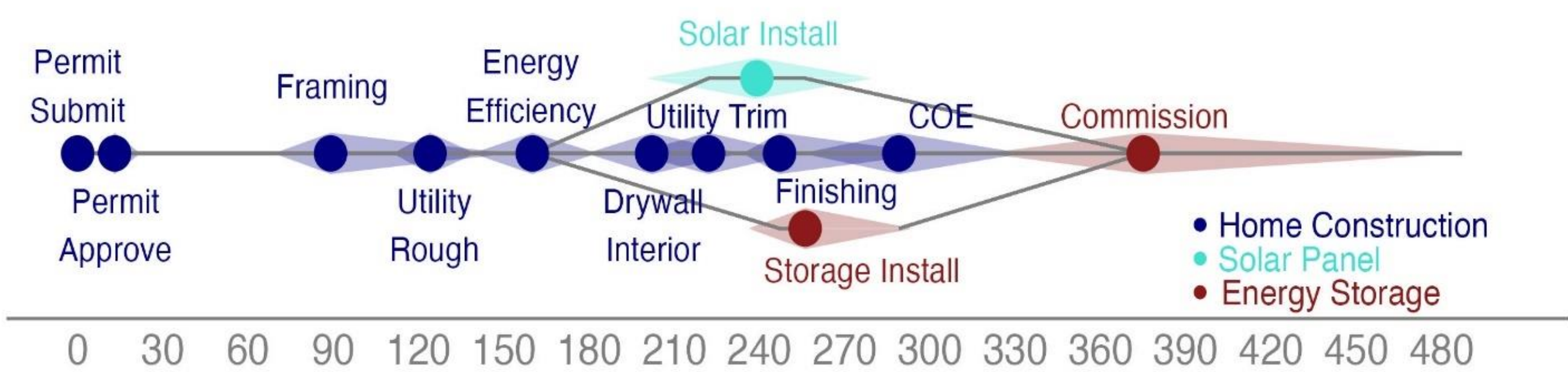


Figure 2. Mandalay Homes cumulative duration (days) based on stage median durations

Results

Overall system costs are expected to be reduced by 13-25% as compared to the benchmark case, depending on the scenario. PV and battery materials such as the module, battery pack, and inverter segments contributed between 30 – 45% of total estimated cost reduction depending on the scenario. Thereafter two soft cost categories account for ~11 – 18% of cost reduction including customer acquisition and overhead.

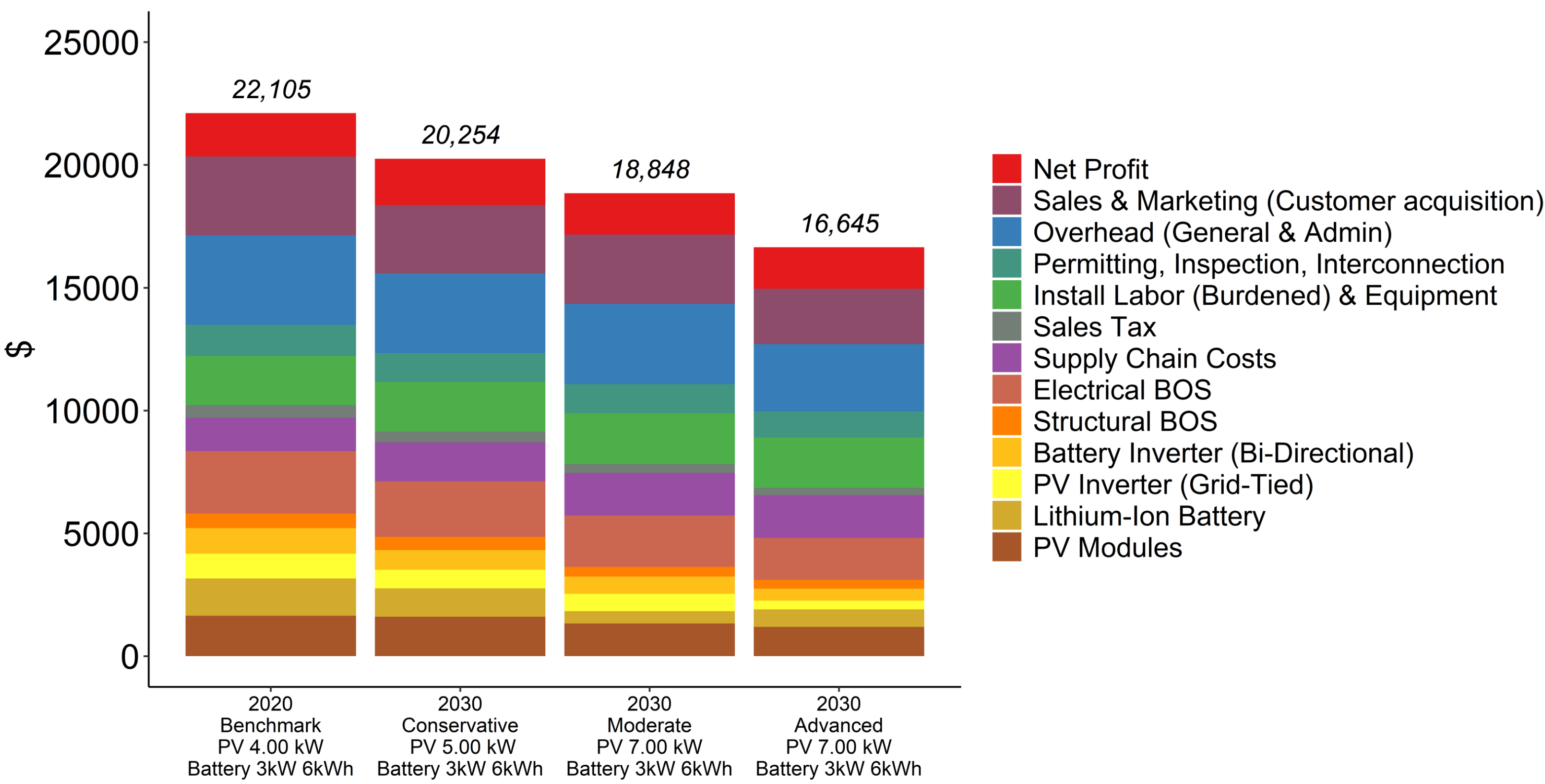
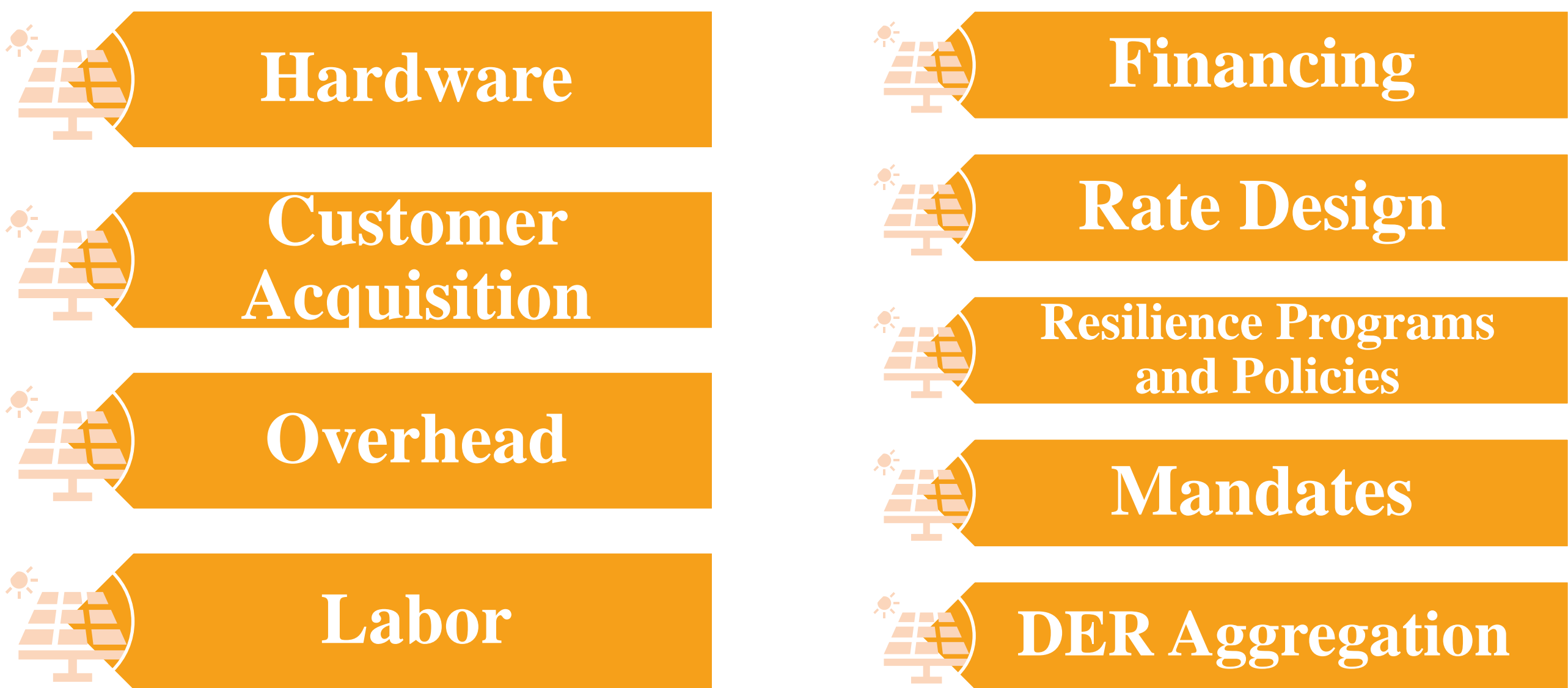


Figure 3. Comparison of current and 2030 residential PV plus AC-coupled storage costs

Opportunities and Barriers



Conclusion

The study’s results suggest that there are four key cost-reduction opportunities, relating to solar and battery hardware, customer acquisition, overhead, and potentially labor. **If future contractors can maximize these cost reduction opportunities, residential new construction costs could decline by 8%–25% by 2030, depending on the modeled scenario**

The report can be accessed here: <https://www.nrel.gov/docs/fy22osti/82511>

