Impact of Solar Investment Tax Credit Extension

Base case and 10-year ITC Extension Forecasts

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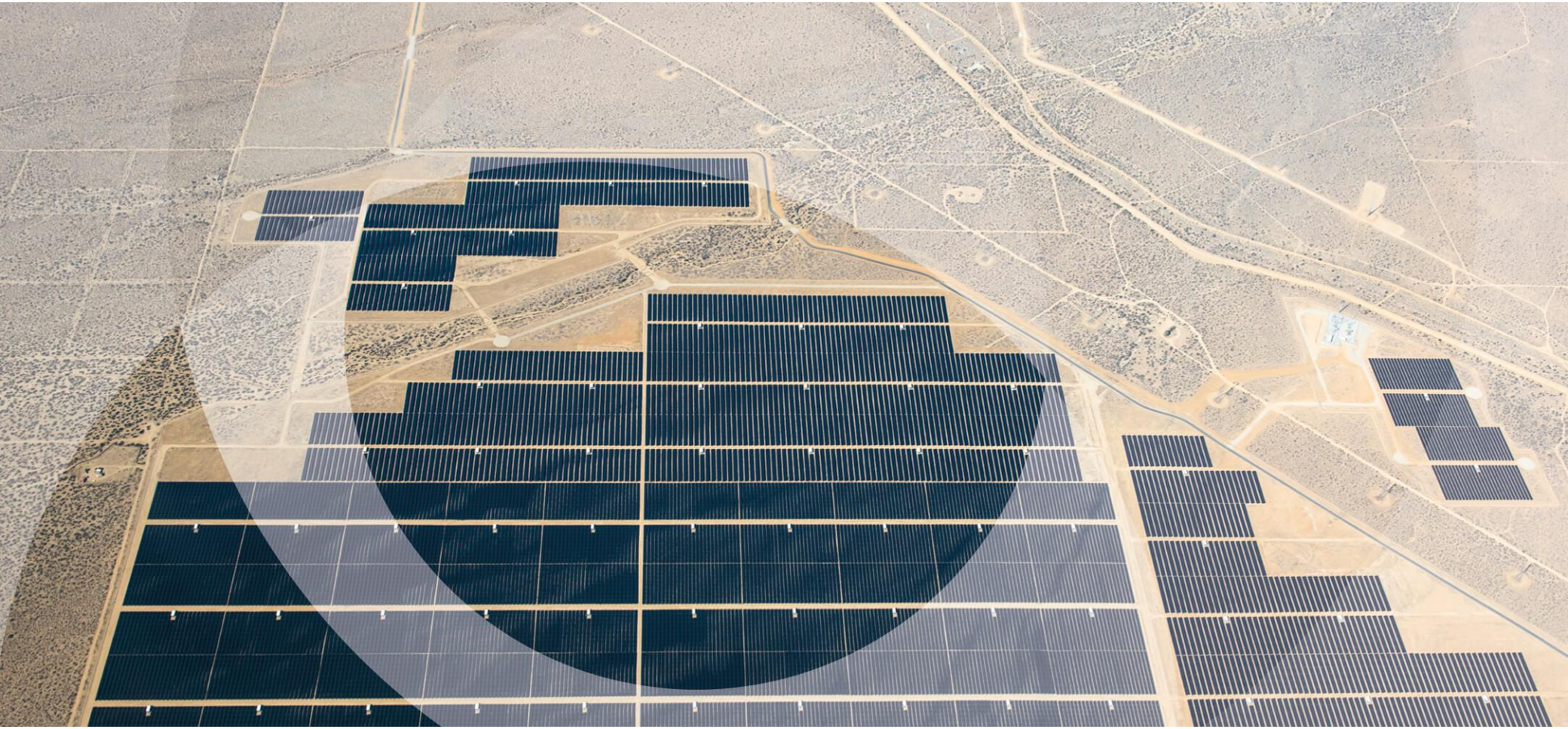


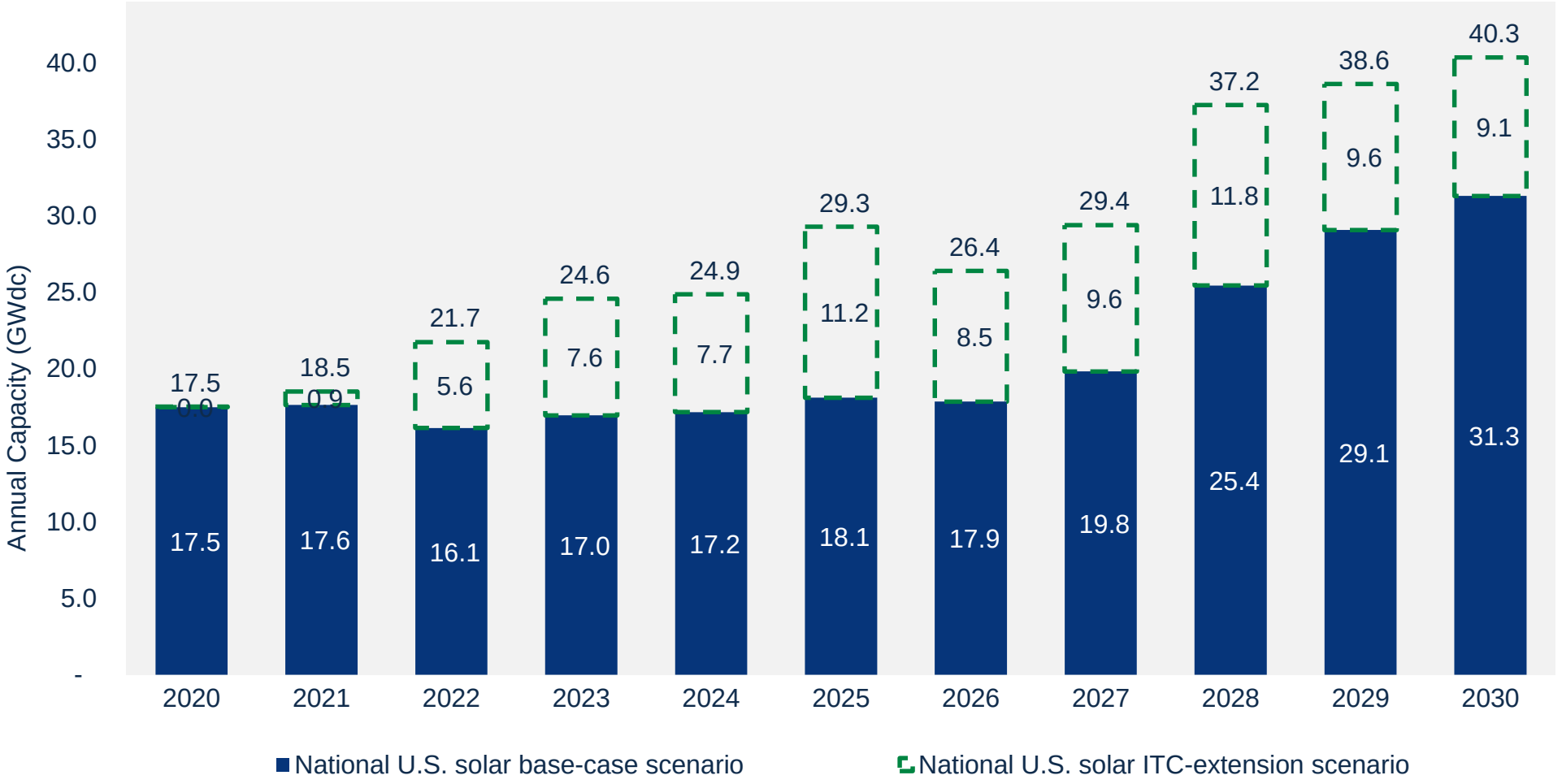
Scope of forecast scenarios

- Wood Mackenzie Power & Renewables has developed a ten-year solar adoption forecast across three solar sub-segments (utility, non-residential, and residential PV) with two scenarios for the Forecast Period:
  - » Scenario 1: Forecast with current ITC step-down. This scenario serves as the Base Case for this study
    - » Commercial, Utility and Third-Party Residential ITC Step-Down: 26% in 2020, 22% in 2021, 10% in 2022
    - » Residential Direct Ownership ITC Step-Down: 26% in 2020, 22% in 2021, 0% in 2022
  - » Scenario 2: ITC extension scenario with 30% ITC to continue to be in effect through 2030.
- *This report was prepared independently by Wood Mackenzie Power & Renewables for the Solar Energy Industries Association®.*

National-level base case and ITC extension forecast scenarios: 2020-2030

Wood Mackenzie forecasts 308 GW of solar installed from 2020-2030 if the ITC is extended at 30% to 2030

The U.S. will install 82 GW more solar under a 30% ITC scenario relative to the base case ITC phase-down representing a 36% increase over base case forecasts

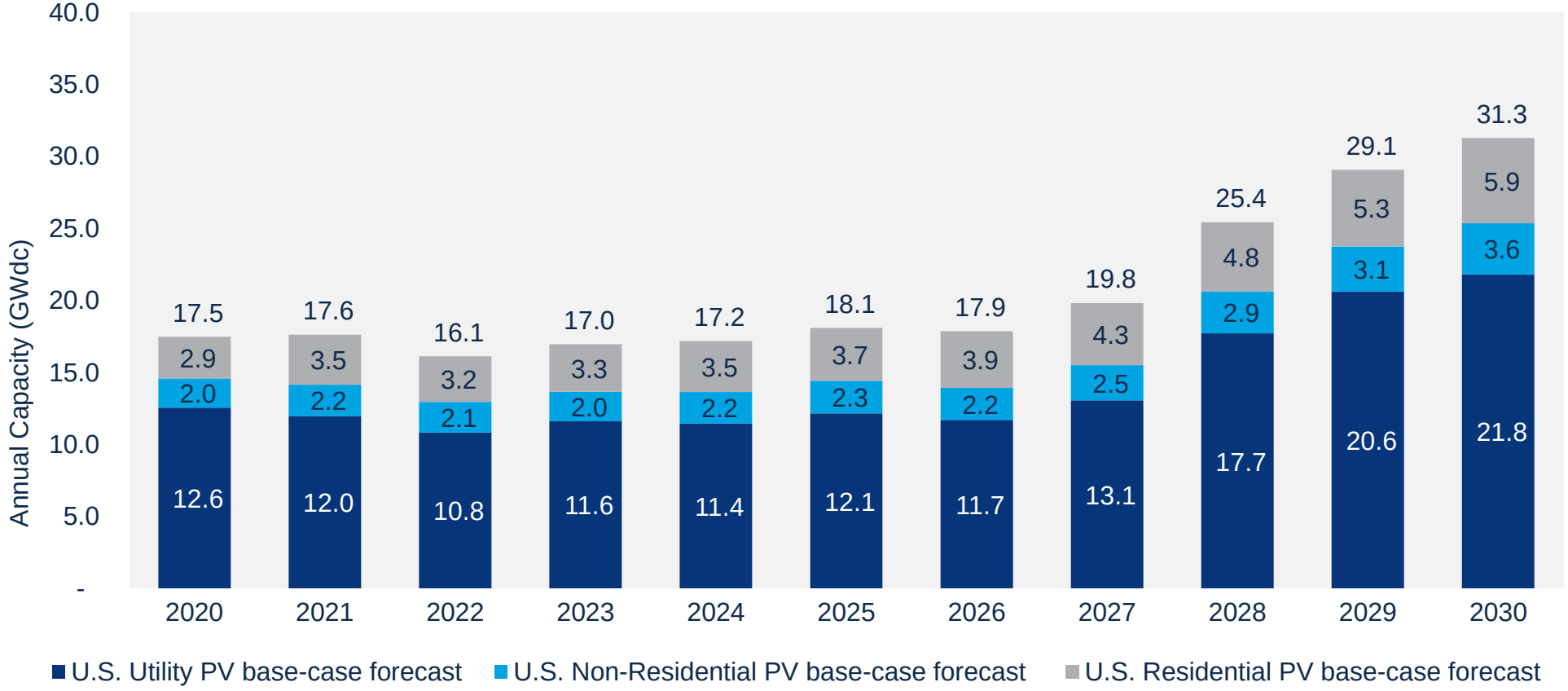


Source: Wood Mackenzie GEM

Under our base case scenario, the U.S. will add more than 227 GW of solar under the scheduled ITC phase-down from 2020-2030

Utility PV will remain the dominant sector driving PV growth due to 100% renewables targets, corporate procurement, and increasing economic competitiveness of solar

Meanwhile, residential growth will be flat through the mid-2020s under an ITC phase-down due to steady customer economics and increasing market saturation while waning state-level incentives constrain commercial solar economics

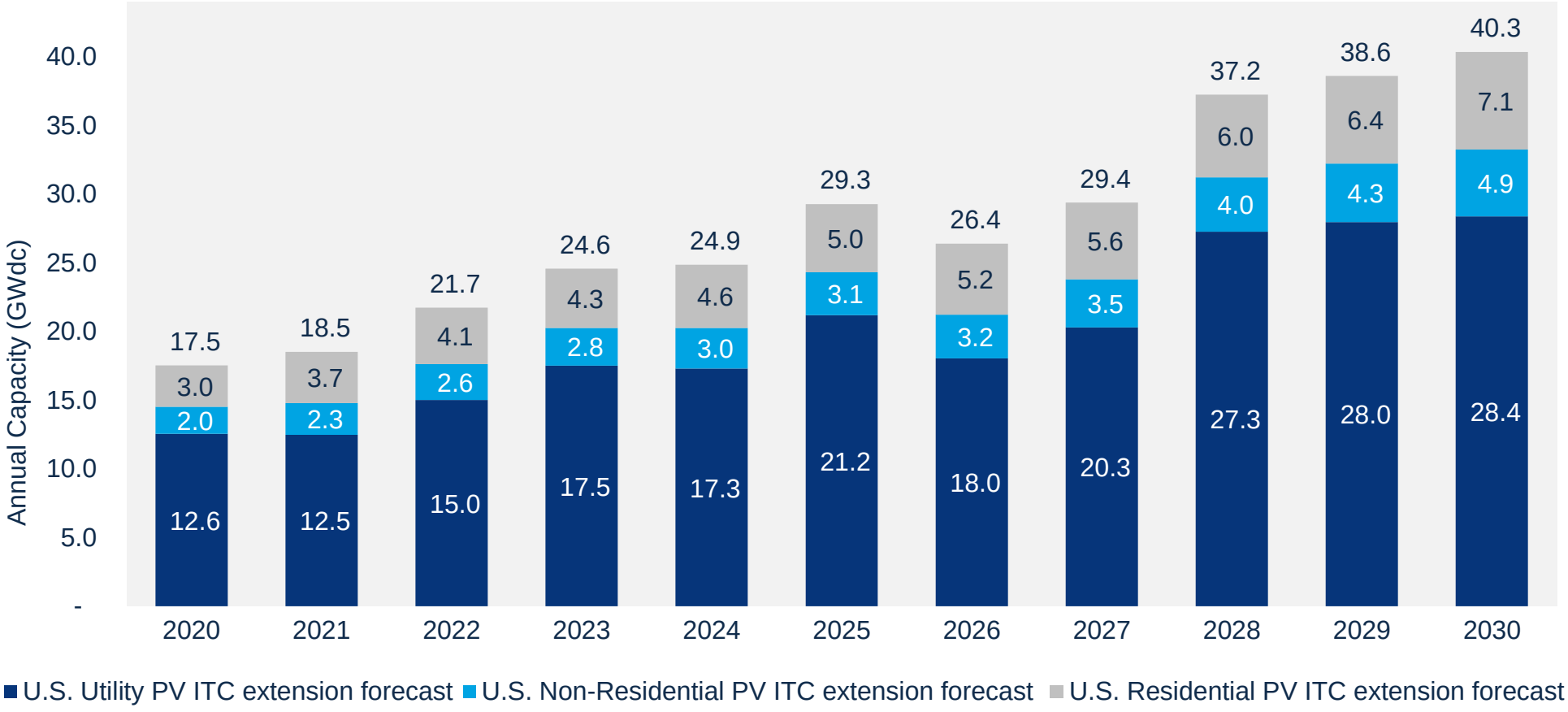


Source: Wood Mackenzie GEM

With a 30% ITC extension to 2030, the U.S. will add more than 308 GW of solar – a 36% increase over the base case scenario

ITC extension drives extensive utility-scale growth as solar becomes lowest the cost generation resource in many markets

Meanwhile, distributed solar continues to grow throughout the 2020s as an increasing number of emerging markets reach grid parity earlier than under the base-case scenario



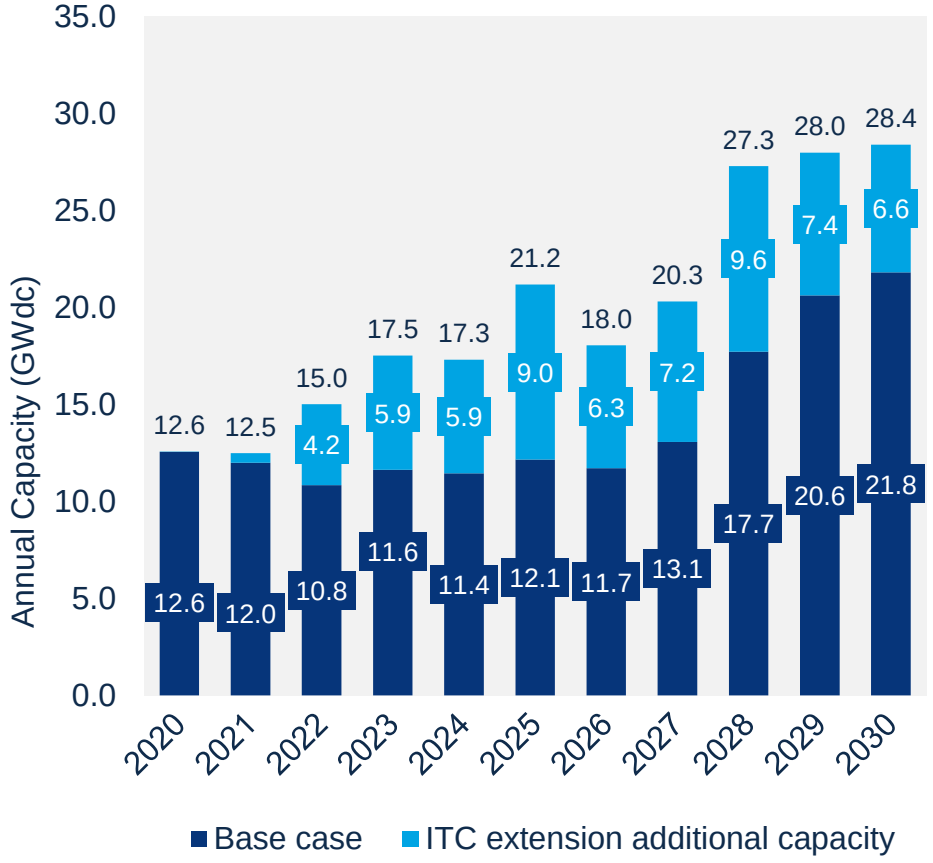
Source: Wood Mackenzie GEM

Base case and ITC extension forecast scenarios 2020-2030 by market segment

Utility PV Forecast – ITC extension results in 40% higher installation volumes than base case scenario

Base case forecast 155 GW from 2020-2030; ITC extension results in 218 GW, a 62.5 GW increase over base case scenario

Utility PV Base Case and ITC Extension Scenarios: 2020-2030

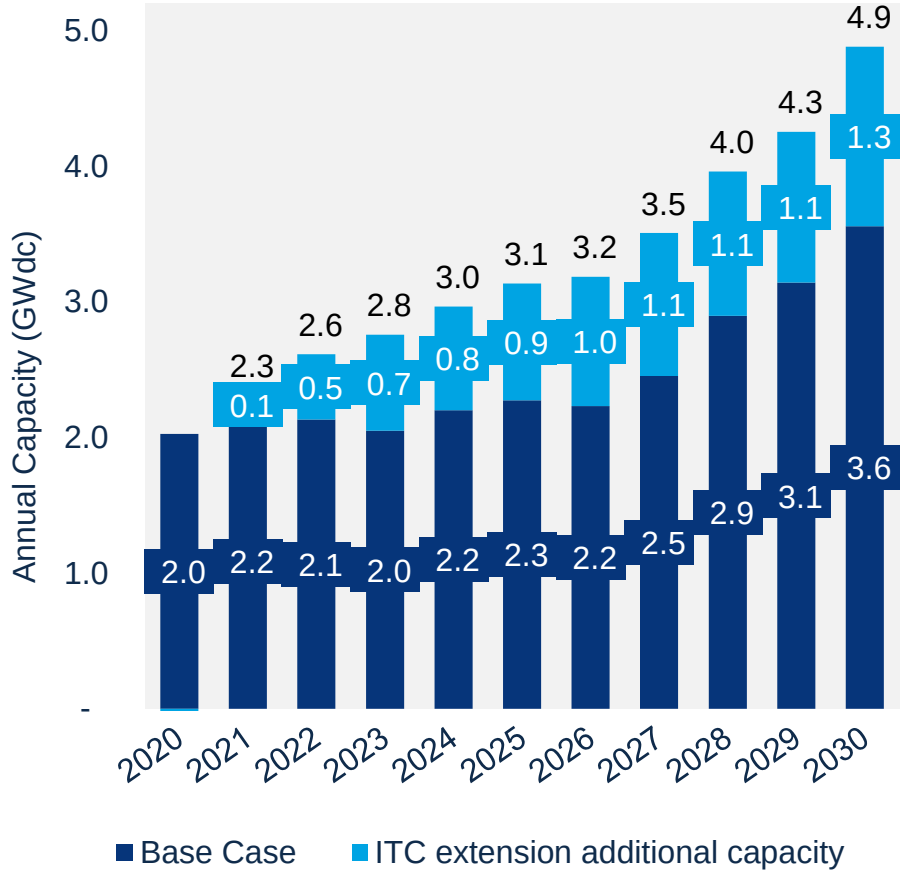


- Coupled with falling prices, an extension of the ITC leads to greater price competitiveness for utility-scale solar, resulting in increased procurement in both established and emerging markets. Utility Solar becomes the lowest cost generation resource in many markets. Additionally, an ITC extension causes greater corporate procurement of large-scale solar, hastens coal retirements, and increases solar + storage adoption.
- Under base case scenario, **33 states** will add more than 1 GW of utility-scale solar from 2020-2030 compared to **41 states** under an ITC extension. Eight additional states: ID, KS, MD, MT, NE, ND, WA, WY.

Non-Residential PV Forecast – ITC extension results in 31% higher installation volumes than base case scenario

Base case forecasts 27.1 GW from 2020-2030; ITC extension results in 35.5 GW, an 8.4 GW increase over base case scenario

Non-Residential PV Base Case and ITC Extension Scenarios: 2020-2030

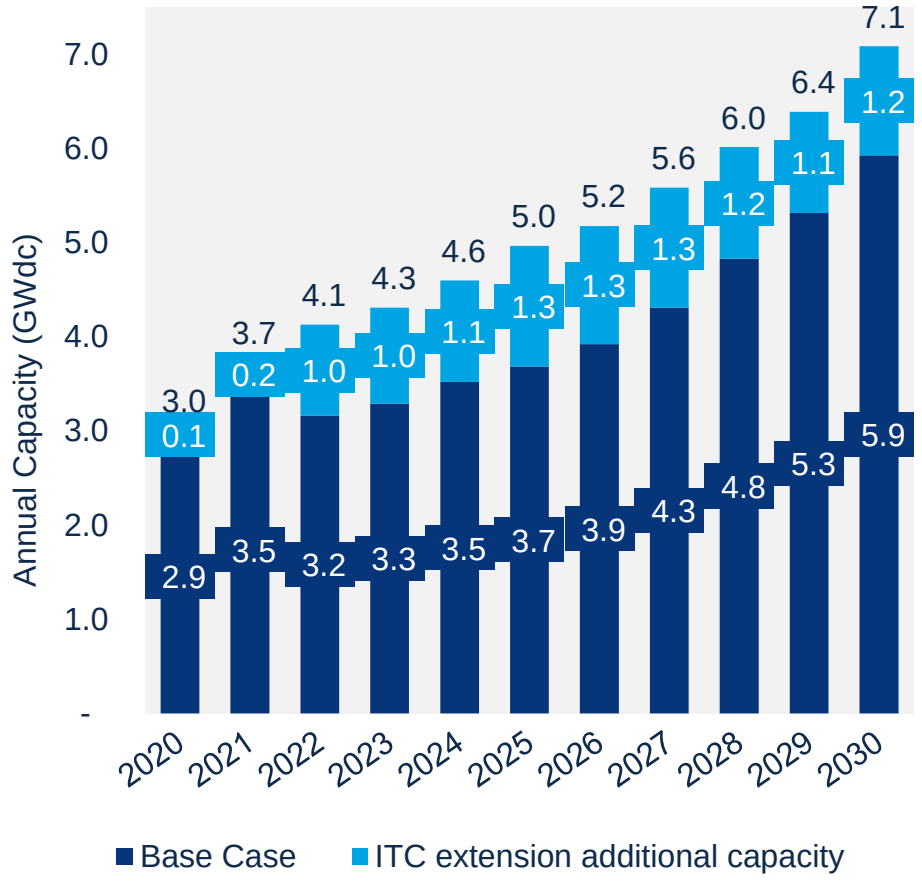


- With expected cost declines and increases in commercial retail electric rates, by 2030 a majority of states will see attractive year-one bill savings under an ITC extension scenario
- Community solar will drive 1/3 of non-residential installation volumes through early 2020s, though projected forecast does not explicitly account for successor programs beyond 2025
- Under base case scenario, **14 states** will add more than 500 MW of non-residential solar from 2020-2030 compared to **21 states** under an ITC extension. Seven additional states: AZ, CT, IA, MI, PA, UT, VA.

Residential PV Forecast – ITC extension results in 24% higher installation volumes than base case scenario

Base-case forecast 44.3 GW from 2020-2030; ITC extension results in 55 GW installed, a 10.6 GW increase over base case scenario

Residential PV Base Case and ITC Extension Scenario: 2020-2030



- A 30% ITC extension to 2030 has the largest impact on low-penetration, emerging state markets, though existing major markets (CA, Northeast) will continue to drive majority of volumes due to higher electricity rates
- However, as retail rates escalate and system costs decline, emerging state markets begin to reach grid parity* beginning in mid-2020s
  - » The rate at which emerging state markets achieve grid parity is accelerated by 1-3 years under an ITC extension scenario
- Under base case scenario, **19 states** will add over 500 MW of residential solar compared to **23 states** under an ITC extension. Four additional states: ID, MN, OH, WA.

*__Grid parity__ is the point at which residential solar LCOE becomes competitive (i.e. achieves parity) with utility-provided electricity

Appendix: Forecast methodology, segment definitions, author bios

Ten-year forecast methodology – distributed and utility PV

- **Distributed solar forecast** will be predicated on a state-by-state assessment of economic attractiveness, which is contingent on several factors:
  - Levelized Cost of Energy ("LCOE") for Solar
    - Current and future net metering and bill compensation design
    - State-level incentives
    - Solar ITC (varies by scenario)
    - System cost assumptions
    - Retail rate forecast assumptions
  - Exogenous factors, such as saturation levels (total addressable market met with solar), competitive landscape evolution, financing trends, etc. will be considered
  - Generation interconnection queue and pipeline assessment, where available
- **Utility solar forecast** will be based on a comprehensive analysis of current utility solar pipeline, utility integrated resource plans, power market dynamics, and public policy initiatives. This includes:
  - Identification of main economic and policy drivers of utility solar growth within each state
  - Identification of barriers to utility solar growth within each market

Additional notes on forecast models and methodology

- **Utility solar forecast model assesses current pipeline, state RPS, utility resource plans, and LCOE and pricing of utility solar to determine long term demand.**
- **Distributed solar projection model compares benchmark LCOE to long-term forecasted retail rates to assess economic attractiveness on state-by-state basis**
  - » Existing state-level incentive programs assumed to expire by mid-2020s
  - » NEM reform is assumed once state surpasses 8.5% market penetration at 75% retail credit
  - » Additional state-wide new-home solar mandate expected by 2025

Segment definitions

- **Utility PV**: A utility PV installation is a project in which the offtaker of the power is a utility, a third-party power supplier, or a commercial/industrial entity. Projects with commercial/industrial entities as the power offtakers are only considered utility-scale if the projects are front-of-the-meter or not located on the company's property. These projects are also referred to as "corporate offsite" projects. Utility PV projects also include any PV systems installed on a non-residential customer's property that participates in a feed-in tariff program, in which the system's power is sold to a utility.
- **Non-residential PV**: A non-residential PV installation is defined as a project in which the offtaker of the power is neither a homeowner nor a utility. The spectrum of non-residential offtakers typically includes commercial, industrial, agricultural, school, government and nonprofit customers. Community solar is also defined as non-residential as well. Although homeowners and apartment tenants unable to install solar are the typical subscribers to community solar systems, the fact that the system has multiple offtakers of power categorizes community solar as non-residential. Within the segment we distinguish between utility-led and third-party-led community solar with the following distinctions:
- **Residential PV**: A residential PV installation is defined as a project in which the offtaker of the power is a single-family household. Any PV system installed on a homeowner's property that participates in a feed-in tariff program is considered residential despite the offtaker of the power being a utility.

About the authors

Austin Perea – Senior Research Analyst, Wood Mackenzie Power & Renewables

Biography

Austin Perea is a Senior Analyst for Wood Mackenzie Power & Renewables where he leads up the firm's distributed solar coverage as the primary author of the U.S. solar market insight report series.

Prior to joining Wood Mackenzie (formerly GTM Research), Austin worked at The Boston Consulting Group, where he supported the energy practice as a research associate. He graduated summa cum laude with a B.A. in economics and political science and a minor in Middle Eastern studies from the University of New Hampshire.

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Colin Smith – Senior Research Analyst, Wood Mackenzie Power & Renewables

Biography

Colin Smith is a Senior Analyst at Wood Mackenzie Power & Renewables where he leads coverage of U.S. utility PV with focus on the competitive landscape and market fundamentals. Colin joined Wood Mackenzie with the GTM Research team where he has been since 2015.

Prior to working at Wood Mackenzie, Colin worked for PHOTON Consulting leading report sales, sales operations, and marketing. Colin also was the sales and operations lead for Next Step Living, residential solar start-up. Colin holds a Bachelor of Science with Honours from Queen's University in Ontario in Sustainability and Biology.

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