



Guidehouse
INSIGHTS

Research Report

Executive Summary:

[Market Data: Mixed-Asset Virtual Power Plant Models](#)

Mixed-Asset Virtual Power Plant Capacity, Implementation Spending, and Revenue: Global Market Forecasts and Analysis

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Section 1

Executive Summary

1.1 Mixed-Asset Virtual Power Plants

Virtual power plants (VPPs) help stakeholders on both sides of the meter achieve energy management goals. Behind the meter (BTM), VPP participation allows distributed energy resources (DER) owners to achieve the greatest possible profits and increase savings on utility bills. In front of the meter (FTM), VPPs help grid operators maintain the proper balance of the electricity grid at the lowest possible environmental and economic cost. As more DER connect to the grid, utilities and grid operators can harness VPP platforms to ensure that interconnected devices remain assets to, rather than burdens on, grid reliability.

Guidehouse Insights defines VPP as:

A system that relies on software and smart grid technologies to remotely and automatically dispatch DER flexibility services to a distribution or wholesale market via an aggregation and optimization platform.

Guidehouse Insights splits VPPs into three models: demand response (DR)-VPPs, supply-side VPPs, and mixed-asset VPPs. DR-VPPs were developed in North America, while supply-side VPPs originated and evolved in Europe.¹ However, flexibility aggregation is evolving from siloed aggregation of automated DR load and renewable generation resources toward broader ecosystem orchestration—the mixed-asset VPP model.

This relatively new hybrid VPP is quickly becoming the model of choice across global regions. Mixed-asset VPPs bring together optimized generation, load, and energy storage to provide a synergistic sharing of grid resources. This VPP model is the focus of this report, as mixed-asset VPP capacity makes up 51% of capacity market share in 2020 and is forecast to scale to 83% of capacity share by 2029.²

1.2 Market Trends

This report examines the market trends leading to the rapid proliferation of mixed-asset VPPs across five major global regions and the commercial and industrial (C&I) and residential customer segments.

¹ More information about DR-VPPs and supply-side-VPPs is available in the Guidehouse Insights *Virtual Power Plant Overview* report, 2Q 2020.

² Guidehouse Insights, *Virtual Power Plant Overview*, 2Q 2020.

Drivers promoting the growth of the mixed-asset VPP market include:

- Growth of DER penetration
- Partnerships, strategic investments, and acquisitions
- Falling energy storage prices
- Europe's COVID-19 stimulus packages and Green Deal
- Federal Energy Regulatory Commission (FERC) Order 841

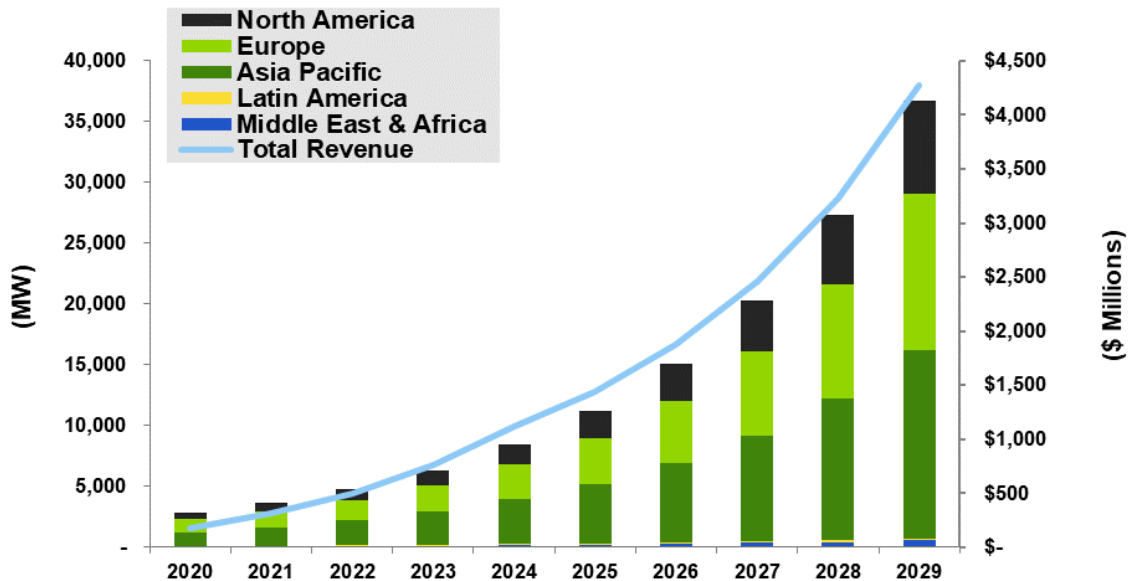
Inhibitors slowing the otherwise more rapid growth of mixed-asset VPPs include:

- Solution ambiguity and overlap
- System costs
- Utility investment cycles

1.3 Market Forecast

Mixed-asset VPP cumulative capacity is expected to grow from 2.8 GW in 2020 to nearly 36.9 GW by 2029 at a compound annual growth rate (CAGR) of 33.1%. As mixed-asset VPPs source capacity from a growing number of FTM and BTM devices, industry revenue is forecast to grow to more than \$4.0 billion annually by 2029. Rates of growth will vary depending on global region and customer segment.

Chart 1-1. Mixed-Asset VPP Capacity and Total Revenue by Region, World Markets: 2020-2029



(Source: Guidehouse Insights)

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Scope of Study

In this report, Guidehouse Insights explores global mixed-asset VPP trends to highlight varying regional activity and markets. Additionally, Guidehouse Insights provides market analysis, sizing, and forecast with respect to mixed-asset VPP markets.

Mixed-asset VPP forecasts include capacity, implementation spending, and revenue. This report segments the market into C&I and residential sectors across five major geographic regions. The regions covered include North America, Europe, Asia Pacific, Latin America, and the Middle East & Africa. A 10-year forecast and market sizing from 2020 to 2029 is included. Additionally, 3Q 2020 market snapshots are also included to demonstrate various DER participation in mixed-asset VPP projects to date. These project share assessments are generated by Guidehouse Insights' internal VPP project tracker.

Sources and Methodology

Guidehouse Insights' industry analysts use a variety of research sources in preparing Research Reports. The key component of Guidehouse Insights' analysis is primary research gained from phone and in-person interviews with industry leaders including executives, engineers, and marketing professionals. Analysts are diligent in ensuring that they speak with representatives from every part of the value chain, including but not limited to technology companies, utilities and other service providers, industry associations, government agencies, and the investment community.

Additional analysis includes secondary research conducted by Guidehouse Insights' analysts and its staff of research assistants. Where applicable, all secondary research sources are appropriately cited within this report.

These primary and secondary research sources, combined with the analyst's industry expertise, are synthesized into the qualitative and quantitative analysis presented in Guidehouse Insights' reports. Great care is taken in making sure that all analysis is well-supported by facts, but where the facts are unknown and assumptions must be made, analysts document their assumptions and are prepared to explain their methodology, both within the body of a report and in direct conversations with clients.

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Notes

CAGR refers to compound average annual growth rate, using the formula:

$$\text{CAGR} = (\text{End Year Value} \div \text{Start Year Value})^{(1/\text{steps})} - 1.$$

CAGRs presented in the tables are for the entire timeframe in the title. Where data for fewer years are given, the CAGR is for the range presented. Where relevant, CAGRs for shorter timeframes may be given as well.

Figures are based on the best estimates available at the time of calculation. Annual revenue, shipments, and sales are based on end-of-year figures unless otherwise noted. All values are expressed in year 2020 US dollars unless otherwise noted. Percentages may not add up to 100 due to rounding.

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