



Distributed Infrastructure Asset Management

Photovoltaics, Energy Storage, Electric Vehicle Charging

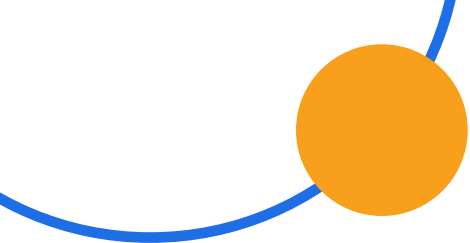
Black & Veatch Management Consulting, LLC (BV) offers a comprehensive distributed and utility-scale asset management and operations solution that provides monitoring and diagnostics, operations and maintenance and portfolio asset management services to distributed infrastructure portfolios over broad geographies. Our distributed infrastructure asset management (DIAM) services are focused on photovoltaics (PV), energy storage systems (ESS), electric vehicle (EV) charging infrastructure and microgrid software and hardware components. Our services also include a PV portfolio performance guarantee that is unique in the DIAM market. We offer similar asset management services for utility scale

projects, which are addressed under a separate service overview.

We incorporate BV's knowledge across multiple asset types and our deep understanding of PV and energy storage technologies to offer asset owners guidance and active management across portfolios of diverse assets. This range of asset knowledge and the tailored integration of asset and operations management services is unique in the market. Our solution builds on our corporate resources and credit standing, engineering, procurement and construction (EPC), operations and management (O&M) and consulting experience globally.



BLACK & VEATCH
MANAGEMENT CONSULTING



Distributed Infrastructure and utility-scale asset owners increasingly hold large portfolios of assets, including PV, ESS, microgrids and EV charging stations. Our DIAM offering is positioned to support the full range of technology and service needs to enable effective operational results and asset portfolio risk management.

The Challenge

The DIAM market notably is characterized by service providers lacking the geographic coverage and experience to service a diverse portfolio of assets. Asset owners often engage with multiple providers to secure asset management (AM) and operational management (OM) services, often with limited preventative and corrective services. This includes fiduciary AM, operations performance management and related engineering services. The result is high unit costs and eroded performance, high opportunity costs and delays in the provision of effective AM and OM services.

The BV Presence

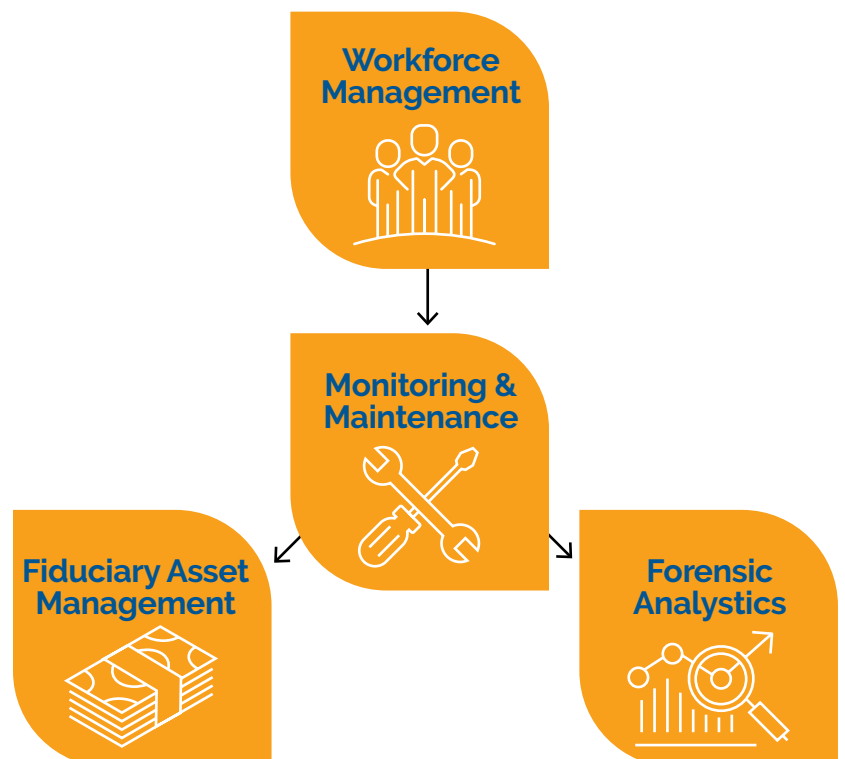
We have 60 full-time engineering professionals in our management consulting asset management practice. Our platform includes multiple regional offices across North America and select international markets. We provide monitoring and maintenance services to a variety of distributed energy resource clients and facilities in the power, oil & gas and water industries. We currently monitor and maintain 150 distributed PV systems across the U.S. and are adding new sites in California, Connecticut, Indiana, Ohio and New Jersey.

Our core asset management services are summarized in the figure below. Our services are anchored on our mature and reliable operations monitoring and maintenance oversight systems, backed by the Black & Veatch Asset 360® data capture and analytics platform. From this platform we also provide work management, our forensic analytics and fiduciary asset management services. This includes OM contract management oversight in an AM role, or OM performance within our suite of services supporting DIAM portfolios. These integrated service offerings are shown in the figure to the right.

The Asset360® Data Analytics Platform

Our **Monitoring & Maintenance** service utilizes the ASSET360® data analytics platform. Developed by BV, ASSET360® is an effective tool to improve asset performance and reliability, detect emerging risks and enable timely maintenance.

- ASSET360® alerts application for identifying alarm conditions and alerts to changes in asset operation that may lead to alarms. The application uses advanced



pattern recognition techniques, including neural networks, clustering and regression, to predict and alert small changes in asset operation.

- ASSET360® Performance Analyst for PV production reporting. The application provides an integrated view of the performance of all the PV portfolio assets and provides a fast and convenient browser interface to evaluate the PV production of individual sites as well as of portfolio site roll-ups.
- ASSET360® Issues Management for facilitating corrective maintenance. The application collects, communicates, prioritizes, tracks and manages the resolution of equipment or asset-wide issues.

Issues management establishes a communication protocol and knowledge base library to facilitate problem identification and resolution. Communication with the sites will be established through the ASSET360® Gateway.

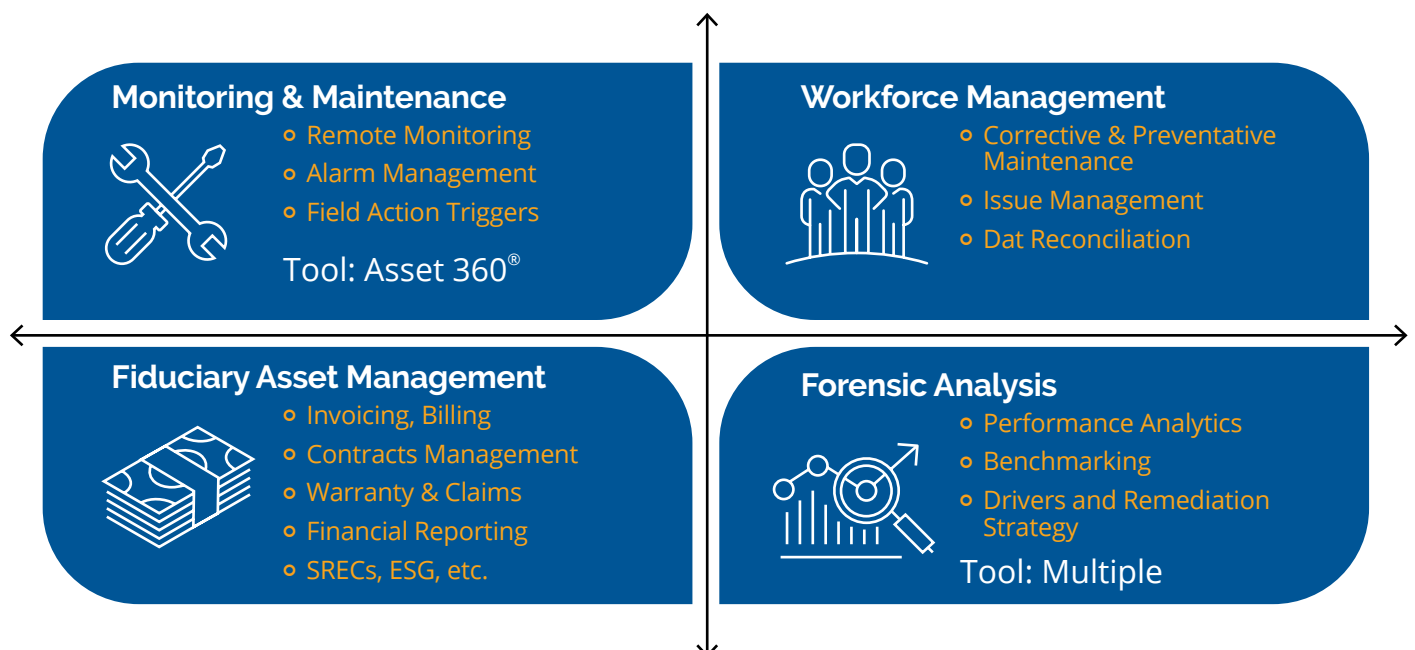
Integrated Solutions

Workforce Management includes the definition, scheduling and execution of preventative and corrective maintenance activities that are required to maintain optimal asset performance. This includes the use of qualified field crews and modern technologies to document the work performed and create an accurate record of “as-built” and “as-maintained” asset data.

Fiduciary Asset Management includes accounts payable and receivable, management of contracts, including loan covenants, equipment warranty and other project contract obligations and metrics, solar renewable energy credit (SREC) reporting, Environmental Social Governance reporting and other project and portfolio risk management components.

Forensic Analysis (FA) for performance improvement extends from our monitoring and maintenance capability with the application of a detailed forensic data analytics service structured to effectively target, diagnose and recommend remedial actions to protect and capture benefit streams results. The FA goes deep in identifying and evaluating the sub-causes of each major contributing factor (example curtailment, OM practices, latent effects). The result is a robust performance analysis, ranking and prescription for value - ranked improvements in portfolio readiness, O&M and latent effect management practices to improve performance. In addition, our FA services provide statistical analysis of less controllable (e.g., weather) events for their residual risk contribution and implied insurance value.

A summary of these three classes of AMS is provided in the figure below, with individual engagements tailored to meet our clients’ project and portfolio needs.



Building a World of Difference.®

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